Mark L. Mallory
Alain J. Fontaine

Key marine habitat sites for migratory birds in Nunavut and the Northwest Territories

Occasional Paper
Number 109
Canadian Wildlife Service

Canada

Environment Canada
Canadian Wildlife Service

Environnement Canada
Service canadien de la faune

Canadian Wildlife Service Occasional Papers

Occasional Papers report the peer-reviewed results of original research carried out by members of the Canadian Wildlife Service or supported by the Canadian Wildlife Service.

Editorial Board

C.D. Ankney
University of Western Ontario

David Cairns
Fisheries and Oceans Canada

Fred Cooke
Simon Fraser University

A.W. Diamond
University of New Brunswick

Charles J. Henny
U.S. Geological Survey

Raymond McNeill
Université de Montréal

Ross J. Norstrom
Canadian Wildlife Service

Austin Reed
Canadian Wildlife Service

Harold Welch
Northwater Consultants

Managing Editors

Hugh Boyd
Canadian Wildlife Service

Erica H. Dunn
Canadian Wildlife Service

Patricia Logan
Canadian Wildlife Service

The Canadian Wildlife Service

The Canadian Wildlife Service of Environment Canada handles wildlife matters that are the responsibility of the Canadian government. These include protection and management of migratory birds as well as nationally significant wildlife habitat. Other responsibilities are endangered species, control of international trade in endangered species, and research on wildlife issues of national importance. The service cooperates with the provinces, territories, Parks Canada, and other federal agencies in wildlife research and management.

For more information about the Canadian Wildlife Service or its other publications, to notify us of an address change, or to ask to be removed from our mailing list, please contact:

Publications
Canadian Wildlife Service
Environment Canada
Ottawa, Ontario K1A 0H3
(819) 997-1095
(819) 997-2756 (fax)
cws-scf@ec.gc.ca
http://www.cws-scf.ec.gc.ca

Mark L. Mallory[1]
Alain J. Fontaine[1]

Key marine habitat sites for migratory birds in Nunavut and the Northwest Territories

Occasional Paper
Number 109
Canadian Wildlife Service
March 2004

Également disponible en français sous le titre
Habitats marins clés pour les oiseaux migrateurs au Nunavut et dans les Territoires du Nord-Ouest
Service canadien de la faune, Publication hors série n° 109.

[1] Canadian Wildlife Service, Environment Canada, Prairie and Northern Region, P.O. Box 1714, Iqaluit, NU X0A 0H0

A member of the Environmental Conservation family

Cover photo: Kittiwakes, guillemots, and narwhal moving through lead in ice near southeastern Ellesmere Island, July 2002. Mark Mallory/CWS

© Her Majesty the Queen in Right of Canada, represented by the Minister of Environment, 2004.
All rights reserved.
Catalogue No. CW69-1/109E
ISBN 0-662-34046-9
ISSN 0576-6370

National Library of Canada cataloguing in publication data

Mallory, Mark Laurence, 1965-

Key marine habitat sites for migratory birds in Nunavut and the Northwest Territories

(Occasional paper, ISSN 0576-6370 ; no. 109)
Issued also in French under tite: Habitats marins clés pour les oiseaux migrateurs au Nunavut et dans les Territoires du Nord-Ouest.
Includes bibiographical references.
ISBN 0-662-34046-9
Cat. no. CW69-1/109E

1. Sea birds – Habitat – Northwest Territories.
2. Sea birds – Habitat – Nunavut.
3. Birds – Migration – Northwest Territories.
4. Birds – Migration – Nunavut.
I. Lafontaine, Alain J.
II. Canadian Wildlife Service.
III. Title.
IV. Series : Occasional paper (Canadian Wildlife Service) ; no. 109.

QL676.57C3M34 2004 333.95'8227'097193 C2003-902685-X

104-04340/

Abstract

The Canadian Arctic contains much of Canada's coastal and marine zones, and these areas support tremendous numbers of marine birds. At the start of the 21st century, the Canadian marine zone is the subject of much concern as a result of a variety of anthropogenic threats. The Canadian Wildlife Service (CWS) is the federal agency responsible for the conservation of migratory bird populations and their habitats in Canada. As part of its mandate, CWS has produced this report identifying key marine habitat sites for migratory birds in Nunavut and the Northwest Territories. This report serves as a statement of CWS interest in marine areas where special wildlife conservation measures may be required, and it is offered as a guide to the conservation efforts of other agencies with interests in Nunavut and the Northwest Territories.

Approximately 10 million pairs of breeding marine birds use the marine areas in Nunavut and the Northwest Territories annually for breeding, feeding, migration, moulting, or wintering. In addition to breeding birds, hundreds of thousands of nonbreeding birds also inhabit these waters. We have defined a key marine habitat site as an area that supports at least 1% of the Canadian population of at least one migratory bird species, following the protocols used previously in Canada and internationally to identify important bird habitats. Marine habitat sites include coastline, open sea, and polynya–shore lead habitats, although the focus of this report is on the last two categories. The sites identified in this report are essential to the welfare of many migratory birds in Canada. As most of these species migrate across international boundaries, many of these sites are also of international importance. Data for the identification of sites were drawn from existing published and unpublished reports and from personal communications. Portions of some sites listed here were identified in an earlier report that focused on terrestrial areas (CWS Occasional Paper No. 71), where the value of the terrestrial site was integrally linked to the marine component.

Currently, CWS manages 18 migratory bird sanctuaries and national wildlife areas in Nunavut and the Northwest Territories. Most of these were set up to protect terrestrial or coastal wildlife resources; only one was set up specifically to protect a large marine zone for seabirds, that being the Nirjutiqavvik (Coburg Island) National Wildlife Area. Nonetheless, the Arctic migratory bird sanctuaries and national wildlife areas contain about 15 000 km^2 of marine habitat within their boundaries, providing some protection for selected marine bird colonies. Many key marine habitat sites are not included in these established sites, however. In this report, we have identified 34 key marine habitat sites, 20 of which are in the High Arctic, 13 in the Low Arctic, and 1 in the Boreal oceanographic zones. The total marine area (excluding islands) included in these sites is 161 000 km^2. The largest site is Amundsen Gulf and the Cape Bathurst Polynya, which includes 30 700 km^2 of marine waters, while the smallest site is East Bay, which encompasses 274 km^2. We have also identified those sites where there are known threats, such as cruise ship tourism or potential oil spill concerns.

Site identification is the first step in getting key marine habitats for migratory birds recognized and protected at some level. We emphasize that not all of the sites listed in this report are targeted to become protected areas. The first goal will be recognition and incorporation of these sites in land use planning by the Nunavut Planning Commission and in planning documents of other agencies that regulate activities in the Arctic marine environment. Some sites will become national or marine wildlife areas, with community support, and the information provided here will help in the establishment of marine protected areas or marine conservation areas.

The identification of key marine habitat sites is a dynamic process, and the importance of each site needs to be reevaluated on a regular basis. As bird populations fluctuate or sea ice conditions change, the value of some sites will change and new sites will be discovered. This report also outlines some of the steps necessary to continue to move the key marine habitat sites process forward, including additional monitoring of some Arctic seabird colonies, research on species that have received little attention in Arctic Canada, renewed offshore survey efforts, and increased collaboration with communities and other partners in marine issues. A review of this report should be conducted each decade to update the status of various sites and list any new ones that have been discovered.

Acknowledgements

Many individuals contributed to various stages of this report. Thanks are extended to Kevin McCormick, Dysart Robb, and Mike Fournier, who drafted part of an early version of a manuscript on which this report was based. Marlene Levesque salvaged part of that early document and saved us time in rewrites. Bonnie Fournier contributed some of the GIS files required to prepare figures used in the text.

Certain experts on marine birds provided information and/or critical reviews of this manuscript. In particular, we are grateful for assistance from Hugh Boyd, Gilles Chapdelaine, John Chardine, Lynne Dickson, Tony Gaston, Grant Gilchrist, Vicky Johnston, Paul Latour, Kevin McCormick, Greg Robertson, Myra Robertson, Ian Stirling, and Leslie Wakelyn. Our sincere thanks go to Pierre Brousseau, Dale Caswell, Kathy Dickson, Tony Gaston, Grant Gilchrist, Vicky Johnston, Flemming Merkel, Ken Ross, and Paul Smith for providing data on certain sites.

This publication was produced by the Scientific and Technical Documents Division of the Canadian Wildlife Service. The following people were responsible: Pat Logan and Maureen Kavanagh — coordination; Sylvie Larose — layout; Marla Sheffer and Raymonde Lanthier (contract editors) — scientific editing; Andrée Marcotte and Elizabeth Morton — production editing; and Mark Hickson — printing.

Contents

1.0 Introduction 7

2.0 Protection of marine areas 8
2.1 Canadian Wildlife Service mandate 8

3.0 Types of marine habitats 10

4.0 Methodology and rationale 14
4.1 Identifying key marine habitat sites for migratory birds 14
4.2 Our approach 14

5.0 Site summaries 18
1 – North Water Polynya 19
2 – Seymour Island 21
3 – Hell Gate and Cardigan Strait 22
4 – Queens Channel 24
5 – Skruis Point 26
6 – Eastern Jones Sound 27
7 – Browne Island 29
8 – Cape Liddon 30
9 – Hobhouse Inlet 32
10 – Eastern Lancaster Sound 34
11 – Prince Leopold Island 36
12 – Cape Hay 38
13 – Baillarge Bay 40
14 – Batty Bay 42
15 – Cape Graham Moore 43
16 – Creswell Bay 45
17 – Buchan Gulf 47
18 – Scott Inlet 49
19 – Amundsen Gulf and Cape Bathurst Polynya 51
20 – Lambert Channel 53
21 – Cape Searle (Qaqulluit) and Reid Bay (Minarets; Akpait) 54
22 – Foxe Basin 56
23 – Cumberland Sound 58
24 – East Bay 59
25 – Markham Bay 61
26 – Coats Island 62
27 – Digges Sound 64
28 – Frobisher Bay 66
29 – Button Islands 68
30 – Akpatok Island 70
31 – Ungava Bay Archipelagoes 72
32 – Sleeper Islands 74
33 – Belcher Islands 76
34 – Northern Ontario Coastline 78

6.0 Discussion 80
6.1 Limitations of current information 80
6.2 Challenges for progress 80
6.3 Achievements 81
6.4 Next steps 81

7.0 Literature cited 83

List of tables

Table 1. National wildlife areas and migratory bird sanctuaries in Nunavut and the Northwest Territories that include protected marine components (as of December 2001) 9

Table 2. Birds that occur in marine areas of Nunavut and the Northwest Territories for part or all of their annual cycle 11

Table 3. Population estimates of certain migratory bird species and subspecies that occur within Nunavut and the Northwest Territories and that were used in identifying key marine habitats 15

Table 4. Approved criteria for selection of CWS marine areas of interest 15

List of figures

Figure 1. Satellite image of the Canadian Arctic, April 2002 12

Figure 2. Recurrent polynyas and shore leads in the Canadian Arctic 13

Figure 3. Colonies of (a) Thick-billed Murres, (b) Northern Fulmars, and (c) Black-legged Kittiwakes in Nunavut and the Northwest Territories 16

List of appendices

Appendix A. Federal powers for protecting marine areas	86
Appendix B. Federal oceans-related legislation	86
Appendix C. International and continental conservation initiatives for birds using marine areas	88

1.0 Introduction

Canada is a maritime nation with tremendous water resources (Healey and Wallace 1987). Our country, surrounded by three oceans, has the longest coastline in the world (243 000 km; Mercier and Mondor 1995), the largest archipelago, and the second largest continental shelf (3.7 million square kilometres; Day and Roff 2000). Canada's sea surface area is roughly equivalent to one-third of its land area (Fisheries and Oceans Canada 1997). This vast marine area includes coastal islands, wetlands, salt marshes, estuaries, seagrass beds, intertidal mudflats, polynyas, sea mounts, shelf breaks, banks, and nutrient upwellings, all of which support complex marine ecosystems. Much of this marine area lies in the Canadian Arctic. At the start of the 21st century, however, Canada's oceans and coastlines are the subject of much concern over sovereignty, fishing or overfishing, shipping, tourism, oil spills, pollution discharge, severe weather, and ice pack changes (e.g., Kelleher 1994; Day and Roff 2000). In response to these pressures, efforts towards identification and conservation of important marine areas are growing internationally and within Canada (Zurbrigg 1996; Fisheries and Oceans Canada 1997; Costanza et al. 1998; Day and Roff 2000; Jamieson and Levings 2001).

A tremendous number and diversity of birds rely on marine habitats for breeding, feeding, migration stopovers, and wintering sites. Nearly 100 species of marine birds, waterfowl, waterbirds, and shorebirds can be found along Canadian marine coasts or offshore at some point during the year (Godfrey 1986; Gaston 1996). Because adequate habitat (in both quantity and quality) is fundamental to the conservation of all wildlife, the Canadian Wildlife Service (CWS) identifies, protects, and manages habitats of particular ecological value to wildlife. While efforts in the past have largely focused on terrestrial or shoreline habitats (e.g., Alexander et al. 1991), key marine sites require similar approaches. In Nunavut and the Northwest Territories, there is an increasing need for various agencies (federal and territorial governments, institutes of public government, Inuit organizations, nongovernment organizations, industry) to become aware of the locations of important wildlife areas. Identification of key wildlife areas is a first step in ensuring their protection. An earlier summary of key terrestrial sites for migratory birds in Nunavut and the Northwest Territories has been widely used in the past decade (Alexander et al. 1991). The present report identifies key marine habitat sites within Nunavut and the Northwest Territories that are essential to the welfare of various migratory bird species in Canada. While this is not intended as a catalogue of candidate "marine protected areas," it does serve as a statement of CWS interest in marine areas where special wildlife conservation measures may be required, and it is offered as a guide to the conservation efforts of other agencies with interests in Nunavut and the Northwest Territories.

2.0 Protection of marine areas

In Canada, several federal departments have legislative tools that can be applied to marine areas (Appendices A and B). The lead federal department in marine protected areas is the Department of Fisheries and Oceans, which administers the *Oceans Act*, passed in January 1997, as well as several other important pieces of legislation, including the *Fisheries Act* (Fisheries and Oceans Canada 1997). Additionally, Parks Canada, Department of Canadian Heritage, administers the *National Parks Act* (2000), which permits the creation of national marine parks or national marine conservation areas (following the National Marine Parks Policy [1986] and the National Marine Conservation Areas Policy [1994]; Mercier and Mondor 1995). There are also a variety of legislative tools that govern permissible activities in marine waters (summarized in Fisheries and Oceans Canada 1997; Appendix B).

For birds that occur in marine areas, identification and protection of key marine areas fall under the mandate of CWS, Environment Canada.

2.1 Canadian Wildlife Service mandate

CWS is the federal wildlife agency responsible for the conservation of migratory bird populations and their habitats in Canada. Migratory bird habitats include both terrestrial (e.g., Alexander et al. 1991) and marine (Zurbrigg 1996) ecosystems. CWS responsibilities for migratory bird populations are pursuant to legislation in the *Migratory Birds Convention Act* (1917, 1994). Under this Act, CWS administers the Migratory Bird Regulations (1997), which regulate hunting and possession of migratory birds, and the Migratory Bird Sanctuary Regulations (1997), which provide for the establishment and management of migratory bird sanctuaries. Sanctuaries are created to provide long-term protection for migratory bird populations and their habitats. With this legislation and the consideration of marine areas, the goal is to protect coastal and marine habitats that are heavily used by birds for breeding, feeding, migration, or overwintering.

Under the *Canada Wildlife Act* (1973), CWS may take measures necessary for the protection of any species of nondomesticated animal in danger of extinction or acquire lands for the purposes of wildlife research, conservation, or interpretation. In marine areas, the latter power allowed for the creation of national wildlife areas up to the 12-nautical-mile limit of the territorial sea. In 1994, the *Canada Wildlife Act* was amended to allow creation of national wildlife areas out to the 200-nautical-mile limit (exclusive economic zone), so as to better address both coastal and offshore marine conservation issues (Zurbrigg 1996). These protected sites would be known as marine wildlife areas. The intent is to protect and conserve, through the establishment of marine wildlife areas, marine areas that are nationally or internationally significant for all wildlife, although focused primarily on marine birds. The administration and management of such areas are governed by the Wildlife Area Regulations (1997). The *Canada Wildlife Act* also gives CWS responsibility for conservation and protection of endangered wildlife species, along with provincial or territorial legislation.

CWS is the lead federal agency in the implementation of the *Species At Risk Act*. This Act seeks to prevent Canadian wildlife species from becoming extinct, to recover those that are in danger of becoming extinct, and to ensure that common wildlife species stay common. CWS is also the federal lead in implementing the Accord for the Protection of Species at Risk in Canada and the Canadian Habitat Stewardship Plan (Government of Canada 2002).

CWS, in cooperation with the provinces and territories, represents Canada on several international and continental conventions and agreements that have implications for wildlife conservation (see Appendix C).

Consistent with its enabling legislation and other federal policies such as the Federal Policy on Land Use (1981), the Northern Mineral Policy (Canadian Wildlife Service 1989), and the Minerals and Metals Policy of the Government of Canada (Natural Resources Canada 1996), CWS identifies, protects, and manages habitats of particular ecological value to wildlife — a vital part of the Canadian natural heritage. CWS also recognizes that other federal departments have means by which to protect and manage marine habitats (Appendices A and B). CWS has already identified 80 key terrestrial sites for migratory birds in Nunavut and the Northwest Territories, many of which include marine areas (Alexander et al. 1991). There are approximately 15 000 km^2 of important marine habitat currently protected in the Arctic as part of migratory bird sanctuaries or national wildlife areas (Table 1).

Table 1
National wildlife areas (NWA) and migratory bird sanctuaries (MBS) in Nunavut (NU) and the Northwest Territories (NT) that include protected marine components (as of December 2001)

Site name	Type and territory/province	Marine area (km^2)	Total area (km^2)	Date established
Polar Bear Pass	NWA – NU	214	2 675	1985
Nirjutiqavvik	NWA – NU	1 283	1 650	1995
Bylot Island	MBS – NU	1 500	12 635	1965
Dewey Soper	MBS – NU	1 475	7 930	1957
Queen Maud Gulf	MBS – NU	6 710	61 765	1961
McConnell River	MBS – NU	234	354	1960
Harry Gibbons	MBS – NU	78	1 224	1959
East Bay	MBS – NU	285	1 138	1959
Seymour Island	MBS – NU	20	28	1975
Prince Leopold Island	MBS – NU	243	311	1992
Akimiski Island	MBS – NU, ON	1 664	3 328	1941
Hannah Bay	MBS – NU, ON	88	295	1939
Boatswain Bay	MBS – NU, QC	76	155	1941
Kendall Island	MBS – NT	197	609	1961
Anderson River Delta	MBS – NT	170	1 025	1961
Banks Island #1	MBS – NT	803	19 970	1961
Banks Island #2	MBS – NT	28	170	1961
Cape Parry	MBS – NT	1	2	1961

3.0 Types of marine habitats

There are many identifiable types of habitats in marine ecosystems (e.g., Day and Roff 2000). For the purposes of this report, we have categorized these diverse habitats into three "habitat zones" that are important to migratory birds: (1) coastline, (2) open sea (including inshore, nearshore, and offshore components out to the 200-nautical-mile limit of the exclusive economic zone), and (3) polynyas. These habitats support considerable diversity and abundance of migratory birds in Nunavut and the Northwest Territories (Table 2).

Coastline habitats include important shoreline features, including wetlands, salt marshes, mudflats, and estuaries. Many species of birds, particularly gulls, waterfowl, waterbirds, and shorebirds, rely on these areas to feed during breeding or migration or to rear young. Because they usually incorporate both terrestrial and marine components, most of the key coastal habitat sites in Nunavut and the Northwest Territories have been identified previously (Alexander et al. 1991), and many are protected as migratory bird sanctuaries (Table 1).

Open sea habitats are among our least understood zones with respect to migratory birds. Migratory birds rely on both the benthic (substrate of aquatic basins) and pelagic (water column) realms of the open sea. Most benthic feeders forage in the euphotic zone (0–50 m), where enough light penetrates to allow photosynthesis. Other pursuit divers use the epipelagic component (0–200 m deep; euphotic and dysphotic segregations) of the pelagic realm, where light is sufficient to permit pursuit divers to forage (but insufficient for photosynthesis in the dysphotic zone; Montevecchi and Gaston 1991). Much of the information we have gathered on open sea habitats has come from surveys related to broad-scale environmental assessment work (e.g., McLaren 1982), from opportunistic observations from ships (Huettmann and Diamond 2000) or shore, or from research using recoveries of marked birds (Falk and Moeller 1995; Chapdelaine 1997; Falk et al. 2001). Offshore sites are important as feeding areas, particularly for colonial-nesting seabirds, as spring migration staging areas (McLaren 1982), and as moulting (Huettmann and Diamond 2000) and overwintering areas for some species (Durinck and Falk 1996) (Table 2).

Polynyas and shore leads are another critical type of open sea habitat (Stirling 1997). Polynyas are areas of open water surrounded by ice that may be caused by a variety of factors, including currents, tidal fluctuations, wind, or upwellings (dark areas in Fig. 1; Stirling 1981; Lewis et al. 1996; Barber et al. 2001; Melling et al. 2001). Although they vary considerably in size and shape (Smith and Rigby 1981), they are recurrent sources of open water in an otherwise frozen environment. In addition to recurrent polynyas, there are extensive systems of shore leads throughout the Arctic that are maintained largely by offshore winds and local currents (Smith and Rigby 1981). Polynyas and shore leads provide the open water required as feeding sites for migrating birds and form important migration corridors and staging areas (Fig. 2; see Section 5.0 for legend; see also McLaren 1982; Renaud et al. 1982; Alexander et al. 1997). They also serve as breathing sites for migrating marine mammals (Stirling 1997). Polynyas also sustain higher biological productivity than nearby areas covered in ice (Hirche et al. 1991; Arrigo and McClain 1994), and thus they support locally high concentrations of wildlife (Stirling 1997). Their importance is substantiated in two ways — the clear association between the location of Arctic seabird colonies and concentrations of High Arctic nesting eiders and nearby recurring polynyas (Brown et al. 1975; Brown and Nettleship 1981; Prach et al. 1981; Barry 1986), and the extensive die-offs or reproductive failures that have occurred when shore leads and polynyas have not appeared (Barry 1968; Fournier and Hines 1994; Robertson and Gilchrist 1998) or have come relatively late in the season (Brown and Nettleship 1981).

Table 2
Birds that occur in marine areas of Nunavut and the Northwest Territories for part or all of their annual cycle

Common name	Scientific name	Feeding method and habitat	Use of marine habitats[a]
Red-throated Loon	*Gavia stellata*	Piscivore; marine coasts	B, M
Pacific Loon	*Gavia pacifica*	Piscivore; marine coasts	B, M
Common Loon	*Gavia immer*	Piscivore; marine coasts	M
Yellow-billed Loon	*Gavia adamsii*	Piscivore; marine coasts	B, M
Northern Fulmar	*Fulmarus glacialis*	Piscivore; offshore	B, M, W
Tundra Swan	*Cygnus columbianus*	Herbivore; coastal flats	M
Greater White-fronted Goose	*Anser albifrons*	Herbivore; coastal flats	M
Snow Goose	*Chen caerulescens*	Herbivore; coastal flats	B, M
Ross' Goose	*Chen rossii*	Herbivore; coastal flats	B, M
Brant	*Branta bernicla*	Herbivore; coastal flats	B, M
Canada Goose	*Branta canadensis*	Herbivore; grassy flats	B, M
Greater Scaup	*Aythya marila*	Herbivore; freshwater lakes	M
Lesser Scaup	*Aythya affinis*	Herbivore; freshwater lakes	M
Common Eider	*Somateria mollissima*	Molluscivore; nearshore	B, M, W
King Eider	*Somateria spectabilis*	Molluscivore; nearshore	M, W
Steller's Eider	*Somateria stelleri*	Molluscivore; nearshore	B, M, W
Spectacled Eider	*Somateria fischeri*	Molluscivore; nearshore	B, M, W
Harlequin Duck	*Histrionicus histrionicus*	Insectivore; nearshore	B, M, W
Long-tailed Duck	*Clangula hyemalis*	Crustaceavore; nearshore	B, M, W
Black Scoter	*Melanitta nigra*	Molluscivore; shallow diver	M
Surf Scoter	*Melanitta perspicillata*	Molluscivore; shallow diver	M
White-winged Scoter	*Melanitta fusca*	Molluscivore; shallow diver	M
Common Merganser	*Mergus merganser*	Piscivore; pursuit diver	M
Red-breasted Merganser	*Mergus serrator*	Piscivore; pursuit diver	B, M
Red-necked Phalarope	*Phalaropus lobatus*	Crustaceavore; nearshore	M
Red Phalarope	*Phalaropus fulicarius*	Crustaceavore; nearshore	M
Pomarine Jaeger	*Stercorarius pomarinus*	General predator; offshore	M, W
Parasitic Jaeger	*Stercorarius parasiticus*	General predator; offshore	M, W
Long-tailed Jaeger	*Stercorarius longicaudus*	General predator; offshore	M, W
Little Gull	*Larus minutus*	Scavenger; nearshore	M
Bonaparte's Gull	*Larus philadelphia*	Scavenger; nearshore	M
Mew Gull	*Larus canus*	Scavenger; nearshore	M
California Gull	*Larus californicus*	Scavenger; nearshore	M
Herring Gull	*Larus argentatus*	General predator; nearshore	B, M, W
Glaucous Gull	*Larus hyperboreus*	General predator; nearshore	B, M
Iceland (+ Thayer's) Gull	*Larus glaucoides*	General predator; nearshore	B, M
Great Black-backed Gull	*Larus marinus*	General predator; nearshore	B, M
Black-legged Kittiwake	*Rissa tridactyla*	General predator; nearshore	B, M
Ross' Gull	*Rhodostethia rosea*	Scavenger; nearshore	B, M
Sabine's Gull	*Xema sabini*	Scavenger; nearshore	B, M
Ivory Gull	*Pagophila eburnea*	Scavenger; offshore	B, M, W
Common Tern	*Sterna hirundo*	Piscivore; nearshore	B, M
Arctic Tern	*Sterna paradisaea*	Piscivore; nearshore	B, M
Dovekie	*Alle alle*	Piscivore; offshore	B, M, W
Common Murre	*Uria aalge*	Piscivore; offshore	B, M, W
Thick-billed Murre	*Uria lomvia*	Piscivore; offshore	B, M, W
Black Guillemot	*Cepphus grylle*	Piscivore; nearshore	B, M, W
Atlantic Puffin	*Fratercula arctica*	Piscivore; offshore	B, M, W
Razorbill	*Alca torda*	Piscivore; offshore	B, M, W

[a] Use of marine habitats is classified as occurrence at these sites during breeding (B), migration (M), or wintering (W).

Figure 1

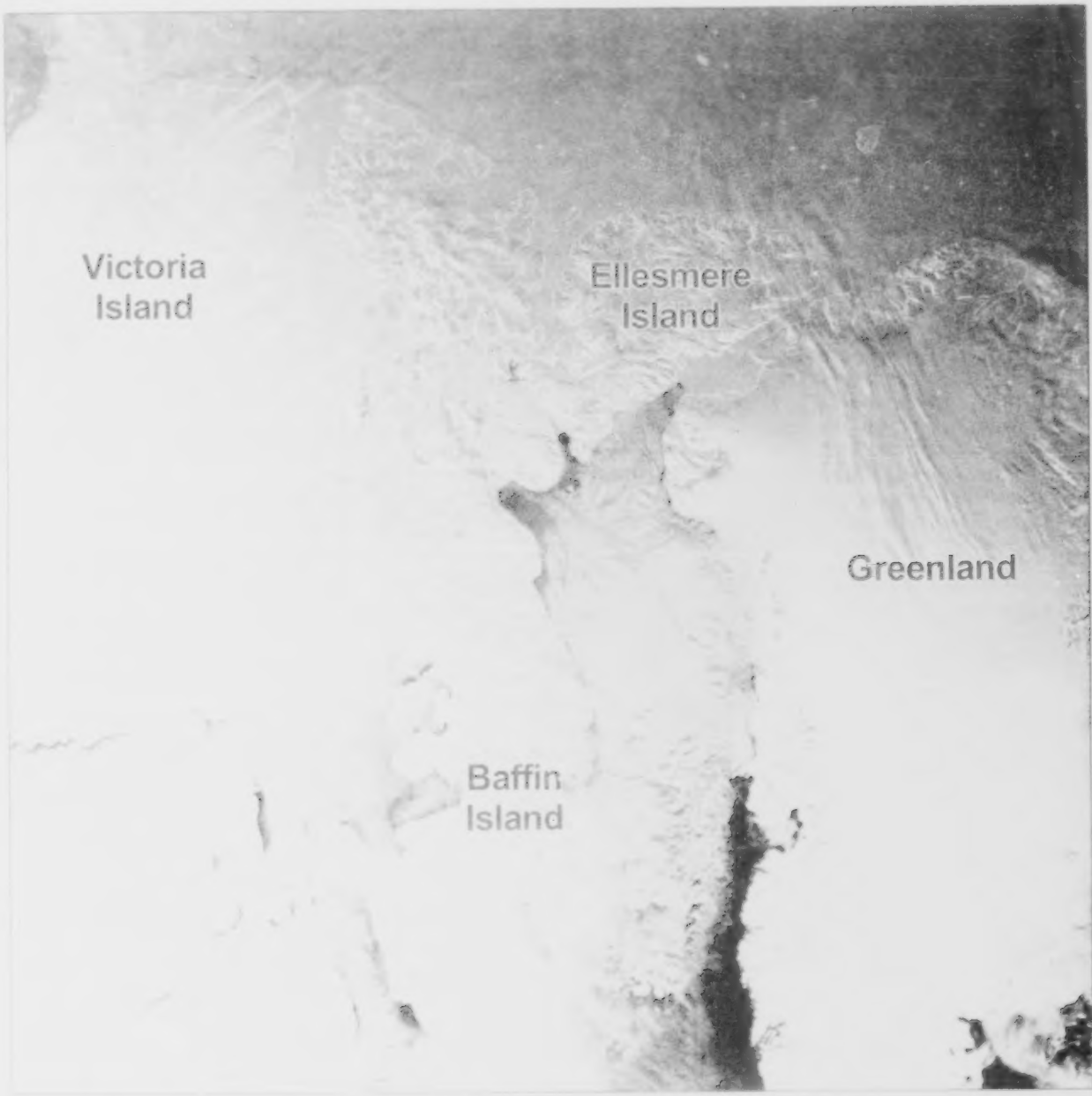

Victoria
Island
Ellesmere
Island
Greenland
Baffin
Island

Figure 1
Satellite image of the Canadian Arctic, April 2002

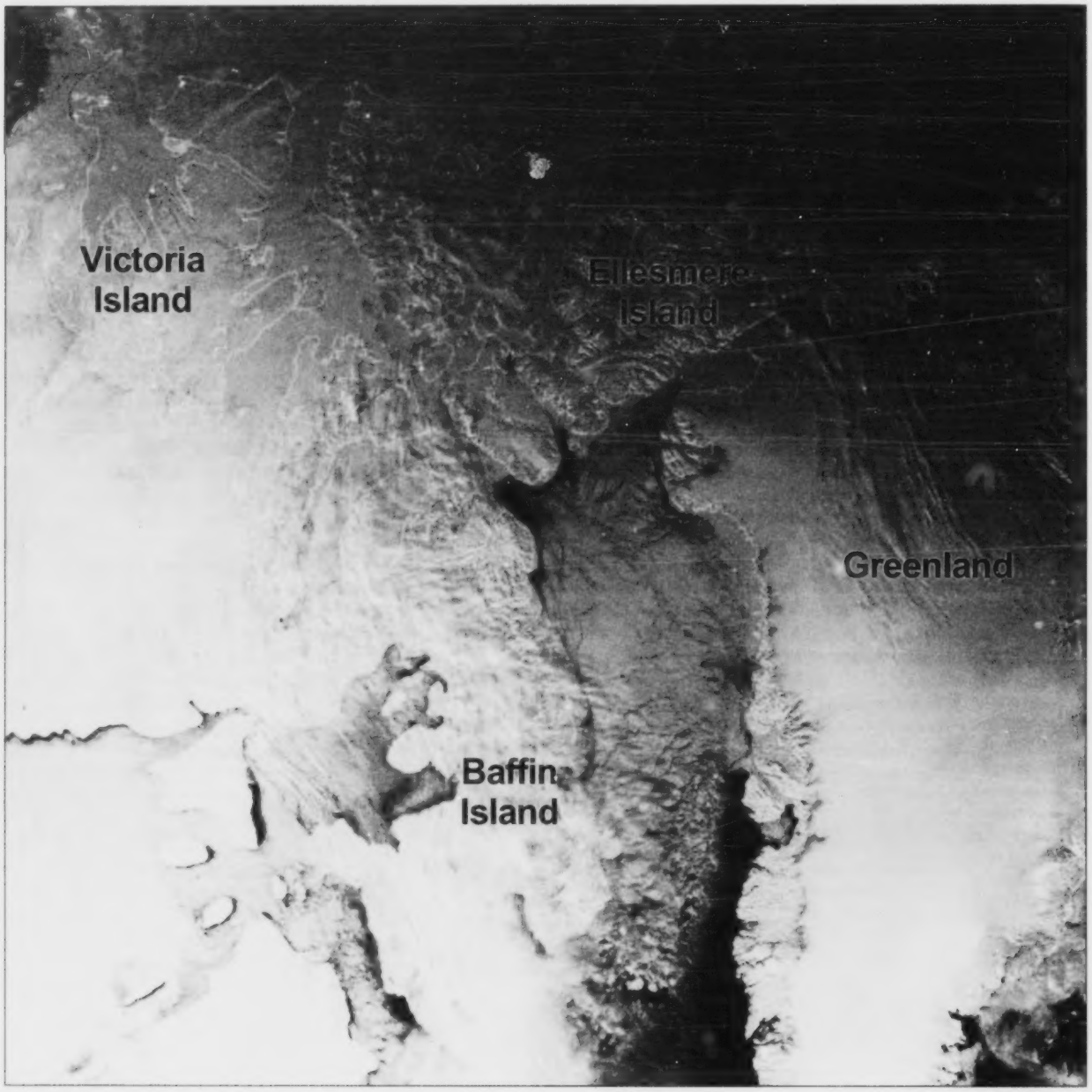
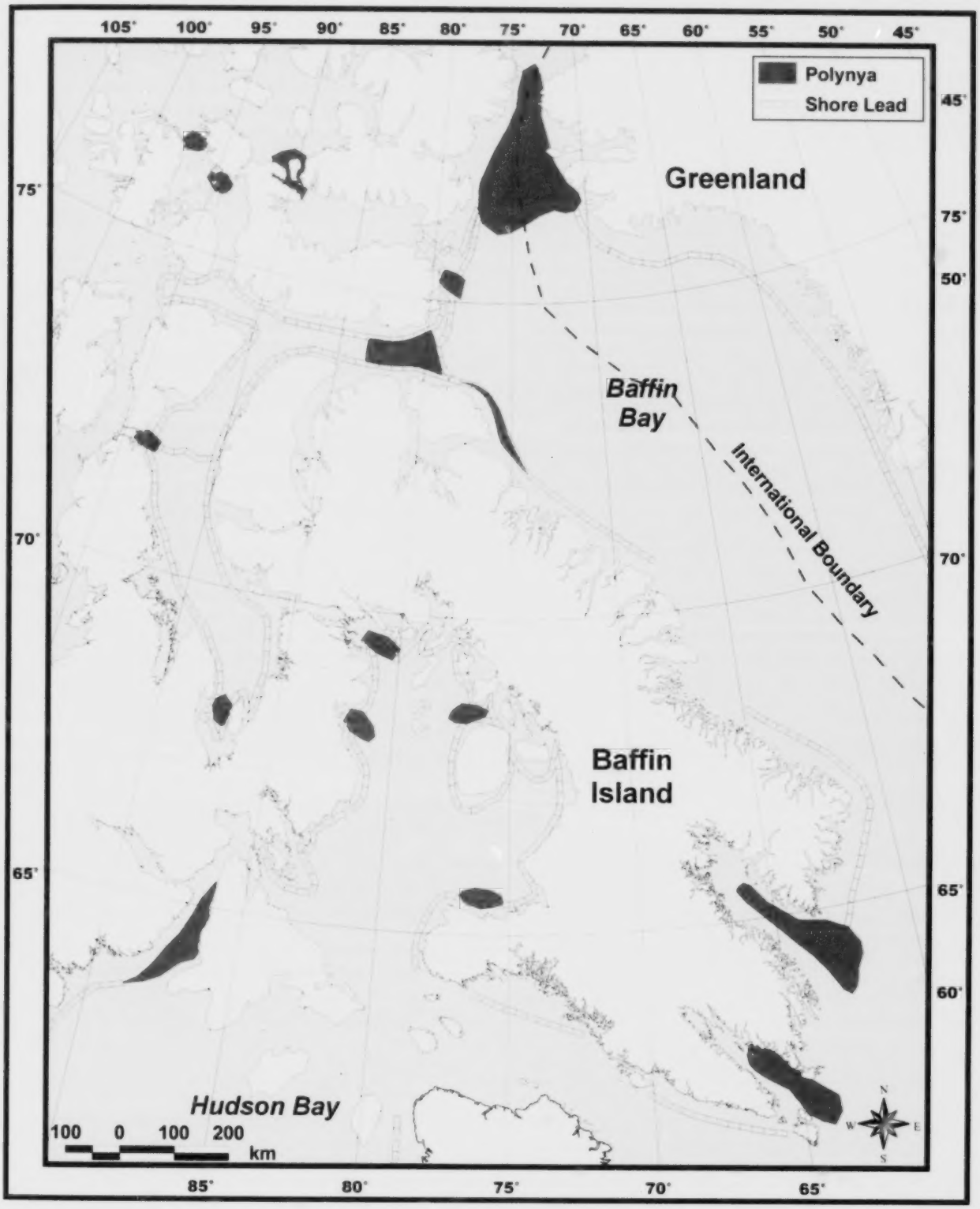


Figure 2
Recurrent polynyas and shore leads in the Canadian Arctic (from Stirling and Cleator 1981)



4.0 Methodology and rationale

4.1 Identifying key marine habitat sites for migratory birds

The delineation of key marine habitat sites for migratory birds is complicated by three factors. First, the nature and distribution of marine biota are influenced by various biological, oceanographic, and physiographic factors (Day and Roff 2000), all of which may vary spatially and temporally. Second, with the exception of adjacent terrestrial features, there are few obvious physical characteristics that define the limits of open sea sites. Third, the large size of some marine areas precludes a simple description of their characteristics or resources. For example, around certain seabird colonies, the distribution of pelagic food resources will vary through the breeding season within the foraging radius of the different species (Gaston and Nettleship 1981). Hence, although no single marine location can be identified as "key," the entire foraging area of the colony can be considered essential. As another example, the occurrence and shape of polynyas will vary seasonally and among years and will grow as the ice surrounding them disintegrates into open water (Stirling and Cleator 1981). Establishing a clear, distinct boundary for the key habitat of a polynya is therefore impractical.

4.2 Our approach

Like the establishment of hunting seasons and harvest limits, the protection of key habitat areas is a population management tool. The degradation or destruction of most of these areas could have a significant impact on a particular population. The importance of a particular area depends on the portion of a population that it supports during any part of the species' annual cycle.

The effectiveness of habitat area protection as a management tool, however, is dependent upon the biology of each species. The following general statements can be made:

- Populations that are geographically widespread or dispersed widely throughout a variety of habitats are not highly vulnerable to site-specific threats. For these species, it would be impractical to control and manage enough habitat to support a significant portion of their populations.
- Populations that are concentrated, for any part of the year, are vulnerable to site-specific threats, because significant portions of the population could be affected. Such habitat sites include staging areas, moulting areas, nesting colonies, and the foraging areas of some species.
- Populations that occupy habitats of restricted geographic areas are vulnerable if their habitat is threatened. Certain rare or endangered species are prime examples.

Migratory bird species that were considered within the context of the above statements are listed in Table 2. Population data are presented in Table 3 for some of these birds (including relevant subspecies). We have relied on the best available estimates of national and regional populations. This approach does have noteworthy limitations. In some cases, the only available information is outdated or limited to a single observation. Although such data are inadequate, they help to provide an initial identification of areas and an indication of where further information is required.

Sites that support at least 1% of a national population (species or subspecies) are considered to be key habitat areas. This criterion has been widely used for many years (Atkinson-Willes 1976; Prater 1976; Fuller 1980; Alexander et al. 1991). It represents a compromise between recognizing a biologically significant portion of a population and the need to avoid identifying the entire geographical range of a population as key habitat. It also meets the criteria accepted for the selection of CWS marine areas of interest by the CWS Executive Committee in 2001 (Table 4).

For many areas in the Arctic, notably recurrent polynyas, locations of bird aggregations are quite predictable (Alexander et al. 1997; Robertson and Gilchrist 1998). However, in many other areas, the varying patterns of annual ice breakup and corresponding supply of open water mean that concentrations of migrating birds will vary among years in a broad marine area; this is especially true of eastern Lancaster Sound, eastern Hudson Strait, and Amundsen Gulf (MacLaren Atlantic Ltd. 1978; McLaren 1982; Alexander et al. 1997). Feeding locations for marine birds during the breeding season also vary within and across years (Gaston and Nettleship 1981). Effectively, more than 1% of the Canadian population of a species could be almost anywhere in these regions on any given day, depending on ice conditions and the distribution of prey species. Given this constraint and the relative paucity of repeat surveys in the Arctic, we have followed a precautionary approach of

Table 3
Population estimates of certain migratory bird species and subspecies that occur within Nunavut (NU) and the Northwest Territories (NT) and that were used in identifying key marine habitats

Species	Subspecies	Population estimates[a] Canada	NU + NT	Reference
Northern Fulmar *Fulmarus glacialis*		236 000	235 000	Hatch and Nettleship 1998
Atlantic Brant *Branta bernicla*	*hrota*	90 000	90 000	Reed et al. 1998
Long-tailed Duck *Clangula hyemalis*		2 500 000 >1 000 000		Hyslop 1996 Robertson and Savard 2002
Common Eider *Somateria mollissima*	*borealis*	300 000	300 000	A. Mosbech, unpubl. data
	sedentaria	50 000	50 000	H.G. Gilchrist, unpubl. data
	v-nigra	35 000	35 000	Dickson and Gilchrist 2001
King Eider *Somateria spectabilis*		315 000	315 000	Suydam 2000
Black Scoter *Melanitta nigra*		185 000	90 000[b]	Bordage and Savard 1995
Glaucous Gull *Larus hyperboreus*		34 600	33 500	Gilchrist 2001
Ivory Gull[c] *Pagophila eburnea*		1 200	1 200	Thomas and MacDonald 1987
Ross' Gull[c] *Rhodostethia rosea*		?[d]	10	Macey 1981; Béchet et al. 2000
Sabine's Gull *Xema sabini*		28 000[e]	28 000[e]	Alexander et al. 1991; Day et al. 2001; V. Johnston, unpubl. data
Black-legged Kittiwake *Rissa tridactyla*	*tridactyla*	200 000	95 000	Nettleship 1980; J. Chardine, pers. commun.
Thick-billed Murre *Uria lomvia*	*lomvia*	1 448 200	1 446 000	Gaston and Hipfner 2000
	arra	400	400	Ward 1979
Dovekie *Alle alle*	*alle*	7 000 000	7 000 000[f]	Renaud et al. 1982
Razorbill *Alca torda*		38 000	56	Chapdelaine et al. 2001
Atlantic Puffin *Fratercula arctica*		365 000	30	Nettleship and Evans 1985; Robards et al. 2000
Black Guillemot *Cepphus grylle*	*ultimus*	76 000	60 000	Nettleship and Evans 1985
		50 000 – 100 000		Butler and Buckley 2002

[a] Given that many estimates are coarse, we have reported all values as breeding pairs (number of individuals / 2).
[b] Individual males; breeding population in NU and NT unknown.
[c] Species at risk (Committee on the Status of Endangered Wildlife in Canada).
[d] Population unknown; only 13 nests have been found in Canada, 10 of which are reported from NU and NT.
[e] Educated guess; Alexander et al. (1991) doubled count of estimated birds from known surveyed areas; V. Johnston surveyed prime habitat in Foxe Basin.
[f] <100 are known to breed in Canada, but most feed in Canadian waters for part of the year.

Table 4
Approved criteria for selection of CWS marine areas of interest

Migratory birds

- The marine or contiguous terrestrial area supports, or has supported, a population of a species or subspecies or a group of species that is concentrated for breeding, feeding, migration, moulting, or wintering for any portion of the year

or

- Where data on populations are available, the marine or terrestrial area supports, or has supported, at least 1% of the Canadian population of a species or subspecies; or a greater percentage of a species' flyway, ecoregional, or other population for any portion of the year

Wild flora and fauna

- The marine or terrestrial area supports an appreciable assemblage of rare, vulnerable, threatened, or endangered species or subspecies of plants or animals, or an appreciable number of individuals of any one or more of these species or subspecies

or

- The marine or terrestrial area has special value for maintaining the genetic and ecological diversity of a region because of the quality and uniqueness of its flora and fauna

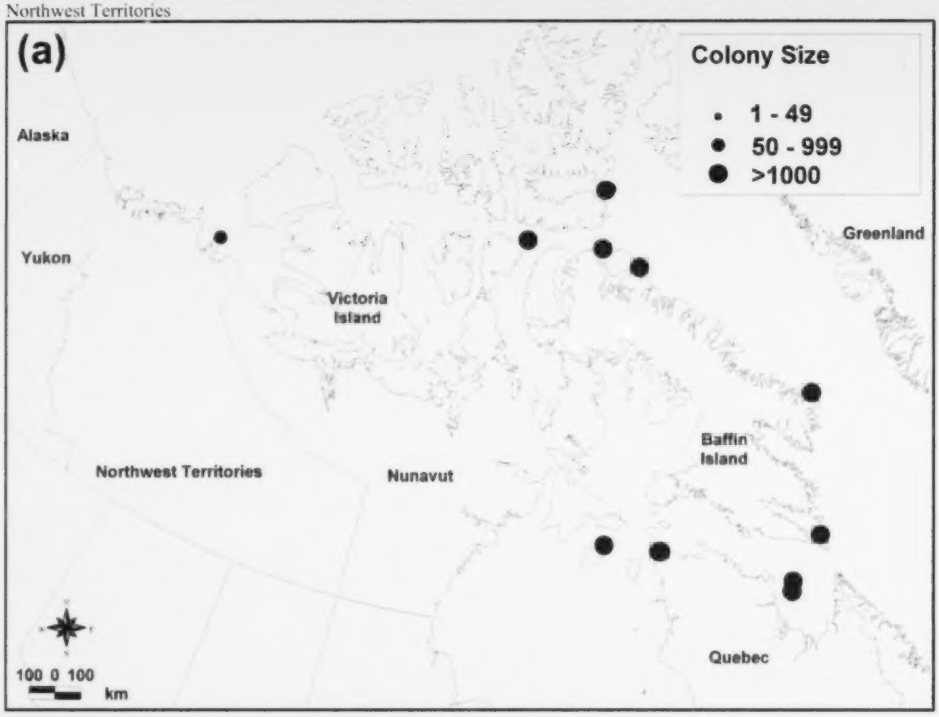
or

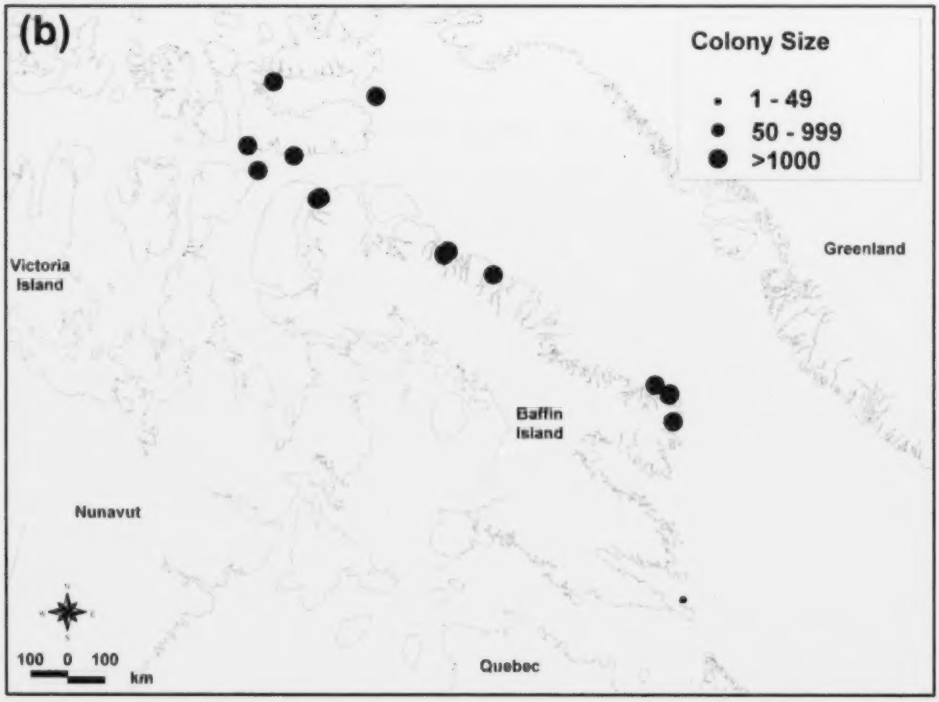
- The marine or terrestrial area has been identified as critical habitat for a listed (Committee on the Status of Endangered Wildlife in Canada) migratory bird or other species-at-risk population

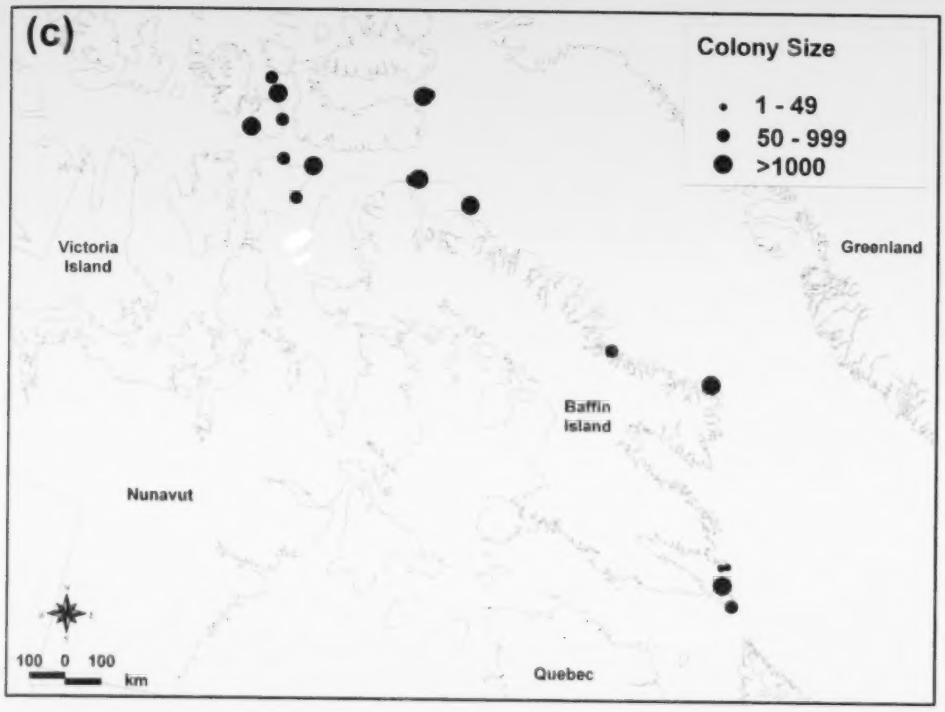
identifying sites where concentrations representing more than 1% of the Canadian population of a bird species are likely to be found in any year. For the most common marine birds in the Arctic, our selection criteria were as follows:

- For Thick-billed Murres *Uria lomvia*, we identified key marine areas around major colonies (Fig. 3) as those within a 30-km radius of the colony. Although many murres forage as far as 200 km from their colony (Gaston and Nettleship 1981; Hatch et al. 2000), a substantial amount of foraging occurs close by (Bradstreet and Brown 1985; Akpatok – 16 km, Tuck and Squires 1955; Cape Hay – <30 km, Johnson et al. 1976; Digges Sound – within 5 km, Gaston et al. 1985; northwest Greenland – 22 km, Falk et al. 2001). Breeding murres often depart the nest site and rest on the water within 10 km of the colony before initiating a foraging trip (H.G. Gilchrist, pers. commun.). More importantly, young murres jump off the cliffs before they can fly and then make a swimming migration with attending adult males (Gaston and Hipfner 2000). Because breeding is relatively synchronized at murre colonies (Gaston and Nettleship 1981), over half of the birds in a colony may be on the water below the breeding cliffs prior to

Figure 3
Colonies of (a) Thick-billed Murres, (b) Northern Fulmars, and (c) Black-legged Kittiwakes in Nunavut and the Northwest Territories







the dispersal of birds at the start of the swimming migration.

- For Black-legged Kittiwakes *Rissa tridactyla*, we identified key marine areas around major colonies (Fig. 3) as those within a 30-km radius of the colony. Adult kittiwakes usually forage <50 km from the colony during chick-rearing (Baird 1994) and, depending on yearly prey distribution, may forage <5 km from the colony (Montevecchi 1996). Most of the major kittiwake colonies in the Arctic are co-located with murre colonies.
- For Northern Fulmars *Fulmarus glacialis*, we identified key marine areas around major colonies (Fig. 3) as those within a 15-km radius of the colony. A 15-km radius is recommended to minimize colony disturbance and to reduce the risk of pollution in the vicinity of the colony. Foraging usually occurs well away from the colony. Fulmars from Cape Searle and Reid Bay may forage in southern Davis Strait several hundred kilometres from the colonies (MacLaren Atlantic Ltd. 1978) and >100 km from the colonies at Prince Leopold Island and Hobhouse Inlet (Hatch and Nettleship 1998). In Greenland, foraging takes place 40–200 km away from the colonies, often in Canadian waters (Falk and Moeller 1995).
- For Black Guillemots *Cepphus grylle*, we identified key marine areas around major colonies as those within a 15-km radius. Guillemots typically feed near shore (Nettleship and Evans 1985; Butler and Buckley 2002) within 10 km of the colony (H.G. Gilchrist, pers. commun.; Mallory, pers. obs.). Auks are highly susceptible to oil spills (Dickins et al. 1990), and thus a 15-km radius around a colony identifies the key foraging area and minimizes disturbance and chances of pollution.
- For Common Eiders *Somateria mollissima borealis*, we identified key marine areas around major colonies as those within a 15-km radius of the colony. Colonial eiders forage in nearshore, shallow areas when they are rearing young, moulting, or staged during migration (Goudie et al. 2000). Nesting eiders are very sensitive to disturbance, so a 15-km buffer was chosen to minimize disturbance during breeding or at foraging sites. Those eiders that overwinter in Arctic waters often occur within 10 km of the coast, in shore leads or melted pools (MacLaren Atlantic Ltd. 1978) or in shallow water polynyas (H.G. Gilchrist, unpubl. data).

These criteria are consistent with protocols established for marine mammals. Fisheries and Oceans Canada (1999) recommends that ships stay 10 miles (16 km) offshore and aircraft stay above 2000 vertical feet (500 m) near areas of known beluga *Delphinapterus leucas* concentrations and that ships stay 1.7 miles (2.7 km) offshore and aircraft stay above 2000 vertical feet (500 m) near walrus *Odobenus rosmarus* haul-outs.

The recognition of key marine habitat sites is a dynamic process. The importance of individual sites changes over time in response to population fluctuations and changes in habitat conditions. As a result, mapped delineations of biologically important areas do not always coincide with existing management boundaries. This report represents our present understanding of the habitat needs of selected migratory bird populations.

5.0 Site summaries

Key marine habitat site (KMHS) information is summarized according to the following format:

Site number: A number that references each site on the accompanying geographic index map of Nunavut and the Northwest Territories (on the inside back cover).

Name: A prominent topographical feature of the nearby terrestrial area, or known names for marine sites.

Location: The latitude and longitude of the approximate geographic centre of each site.

Size: The approximate area, in square kilometres, of each site. The indicated boundaries represent the limits of the biologically important sites.

Description: A brief description of the site, indicating its location relative to prominent land or oceanic features.

Biological value: Relevant species summaries, including numbers present and seasonal occupation and activities (e.g., nesting, staging, moulting, foraging, overwintering). Supplementary information, such as the presence of other wildlife species that contribute to the biological importance of the key marine habitat site, is also included.

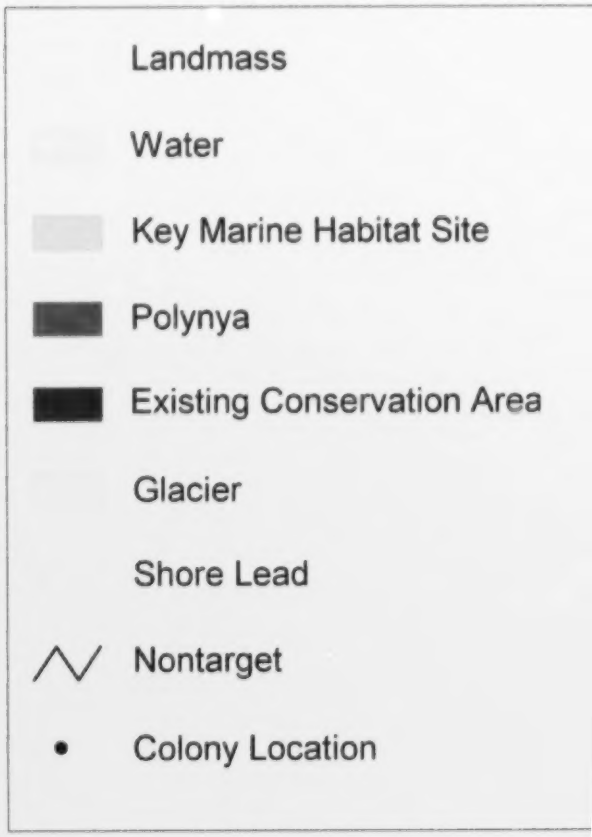
Sensitivities: Types of activities that could destroy or degrade the biological value of the site. Some habitats or species may be particularly susceptible to various factors, even if there are no immediate threats known for the key marine habitat site.

Potential conflicts: Present or proposed activities that could have a negative impact on the site.

Status: Any "conservation area" designations that overlap with the key marine habitat site.

References: Pertinent literature cited in the text as the scientific basis for the identification of the site, but not a complete literature review for each site. Note that we have included unpublished reports in this section. Most of these are important and well-known documents that are available in northern libraries and collections.

Map: Each site summary is accompanied by an appropriate map. Insets in the large maps indicate the position of the key marine habitat site in relation to larger features of the Arctic. The standard mapping conventions are as follows:



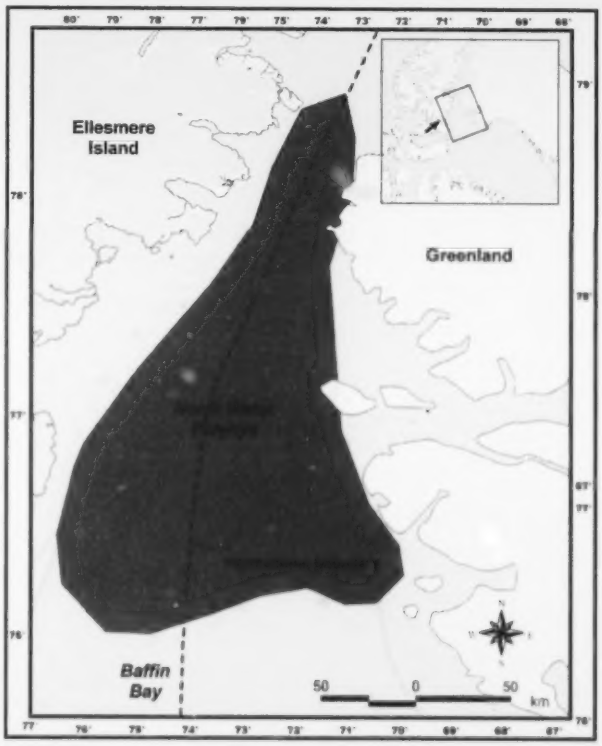
Location: 77°00'N, 75°00'W

Size: Marine – 27 000 km^2; terrestrial – 0 km^2

Description: The North Water Polynya is a large, year-round expanse of open water in northern Baffin Bay, between Ellesmere Island and Greenland (Kalaallit Nunaat). It is the largest and best-known polynya in the Canadian Arctic, although part of this oceanographic feature lies outside Canadian territorial waters. The polynya is situated near the Coburg Island and Inglefield Mountain key terrestrial sites for migratory birds in Nunavut (Alexander et al. 1991).

This polynya lies in the High Arctic oceanographic zone (Nettleship and Evans 1985). Freeze-up begins in Kane Basin in mid-September. The North Water Polynya begins to form in January as an ice bridge is created at Nares Strait, north of Smith Sound, by jammed ice moving south from the Kane Basin (Barber et al. 2001). This feature of the polynya remains constant among years, although the southern boundary varies. New ice that forms south of this bridge is swept away by currents (Tooma 1978), wind (Nutt 1969; Melling et al. 2001), and upwelling (Smith and Rigby 1981; Steffen 1985), with open water maintained by a counter-clockwise gyre in northern Baffin Bay. This results in higher productivity on the east side of the polynya than on the west (Lewis et al. 1996). Constant fast ice forms along the eastern coasts of Ellesmere and Devon islands and northwestern Greenland. The North Water Polynya expands southwards in the first half of May (Smith and Rigby 1981) and joins with shore leads connected to other polynyas in June. In July, the southern boundary merges with open water in Davis Strait, and the Smith Sound ice bridge breaks up in late July or early August. The North Water Polynya is one of the largest and most productive polynyas in the northern hemisphere (Stirling 1980; Hobson et al. 2002).

Biological value: Millions of seabirds breed in the vicinity of the North Water Polynya. Approximately 30 000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, representing 16% of the Canadian population, nest at Cambridge Point, Coburg Island (Nettleship 1980). Over 350 000 pairs of Thick-billed Murres *Uria lomvia* nest in six colonies around the margin of the North Water Polynya (Falk et al. 2001). The Canadian colony, Coburg Island, supports 160 000 pairs, or about 12% of the Canadian population (Nettleship 1980). On the Greenland side, approximately 50% of the Greenland murre population nests in the Thule district near the North Water Polynya (Kampp 1990; Falk and Kampp 1997). An estimated 3000 pairs (1% of the Canadian population) of Northern Fulmars *Fulmarus glacialis* breed on Princess Charlotte Monument beside Coburg Island (Nettleship 1980). Fourteen colonies of Ivory Gulls *Pagophila eburnea*, a species at risk in Canada, are located on southeastern Ellesmere Island, supporting 730–830 adults (30% of the Canadian population; Thomas and MacDonald 1987). Some Black Guillemots *Cepphus grylle* (175 pairs) breed at Coburg Island (Robards et al. 2000), and 3000–4000 (2% of the Canadian population) overwinter in this area (Renaud and Bradstreet 1980). Although very few breed in Canada, an estimated 30 million Dovekies *Alle alle* breed in northwest Greenland near the North Water Polynya (Freuchen and Salomonsen 1958; Roby et al. 1981). Many of these birds (an estimated 14 million) migrate north in the spring along shore leads near eastern Baffin Island and the North Water Polynya (Renaud et al. 1982).

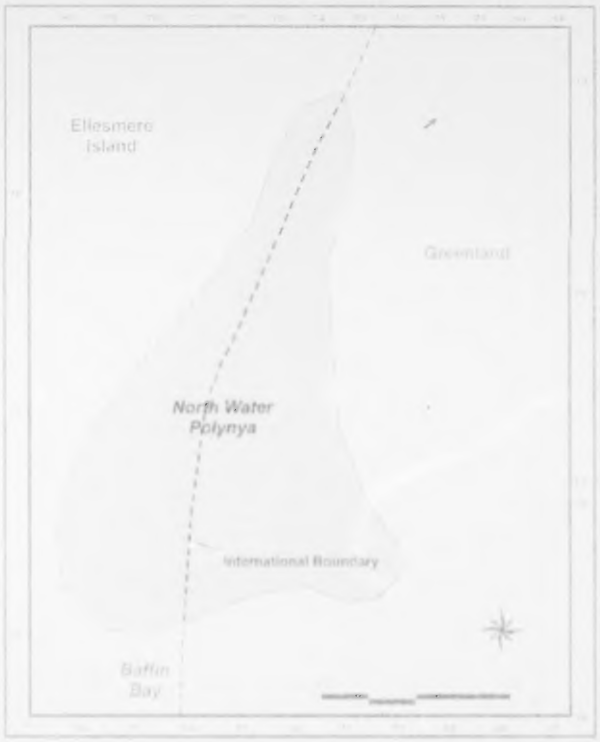


In addition to the tremendous marine bird resources in this area, "the North Water is of significance to more species of marine mammals than any other polynya in the Canadian Arctic" (Stirling et al. 1981: 50). It is used by beluga *Delphinapterus leucas*, bowhead whale *Balaena mysticetus*, narwhal *Monodon monoceros*, migratory walrus *Odobenus rosmarus*, ringed seal *Phoca hispida* (Holst et al. 2001), bearded seal *Erignathus barbatus*, and harp seal *Phoca groenlandica*. A large population of polar bear *Ursus maritimus* also relies on the productivity of ringed seals in the fast ice adjacent to the North Water Polynya over the winter and spring (Stirling et al. 1981; Finley et al. 1983; Riewe 1992).

Sensitivities: Seabirds are sensitive to disturbances at their breeding cliffs and to pollution of their staging and foraging areas.

Potential conflicts: This area is of increasing importance as a tourist destination for cruise ships and small aircraft (Hall and Johnston 1995; Wakelyn 2001). Coburg Island is one of the seabird colonies in Arctic Canada most disturbed by humans (Chardine and Mendenhall 1998).

Status: Coburg Island is an International Biological Programme site (Region 9, Site No. 2-12; Nettleship 1980), and it was protected in 1995 as Nirjutiqavvik National


Ellesmere Island
Greenland
North Water Polynya
International Boundary
Baffin Bay

Wildlife Area, which includes waters within 10 km of the high tide line. Coburg Island and the Inglefield Mountain Nunataks (Ivory Gull colonies) are Important Bird Areas in Canada (NU010, NU014; CEC 1999).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Barber, D.; Marsden, R.; Minnett, P.; Ingram, G.; Fortier, L. 2001. Physical processes within the North Water (NOW) Polynya. Atmosphere-Ocean 39:163–166.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Chardine, J.; Mendenhall, V. 1998. Human disturbance at arctic seabird colonies. Circumpolar Seabird Working Group Technical Report No. 2, Conservation of Arctic Flora and Fauna, Akureyri, Iceland.

Falk, K.; Kampp, K. 1997. A manual for monitoring thick-billed murre populations in Greenland. Greenland Institute of Natural Resources Technical Report No. 7, Thule, Greenland. 90 pp.

Falk, K.; Dall'Antonia, L.; Benvenutti, S. 2001. Mapping pre- and post-fledging foraging locations of thick-billed murres in the North Water Polynya. Ecography 24:625–632.

Finley, K.J.; Miller, G.W.; Davis, R.A.; Koski, W.R. 1983. A distinctive large breeding population of ringed seals (*Phoca hispida*) inhabiting the Baffin Bay pack ice. Arctic 36:162–173.

Freuchen, P.; Salomonsen, F. 1958. The Arctic year. G.P. Putnam's Sons, New York. 438 pp.

Hall, C.M.; Johnston, M.E. 1995. Polar tourism: tourism in the Arctic and Antarctic regions. Wiley & Sons, New York.

Hobson, K.A.; Gilchrist, H.G.; Falk, K. 2002. Isotopic investigations of seabirds of the North Water Polynya: contrasting trophic relationships between the eastern and western sectors. Condor 104:1–11.

Holst, M.; Stirling, I.; Hobson, K. 2001. Diet of ringed seals (*Phoca hispida*) on the east and west sides of the North Water Polynya, northern Baffin Bay. Mar. Mammal Sci. 17:888–908.

Kampp, K. 1990. The thick-billed murre population of the Thule district, Greenland. Arctic 43:115–120.

Lewis, E.L.; Ponton, D.; Legendre, L.; LeBlanc, B. 1996. Springtime sensible heat, nutrients and phytoplankton in the Northwater polynya, Canadian Arctic. Cont. Shelf Res. 16:1775–1792.

Melling, H.; Gratton, Y.; Ingram, G. 2001. Oceanic circulation within the North Water Polynya in Baffin Bay. Atmosphere-Ocean 39:301–325.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Nutt, D.C. 1969. The North Water of Baffin Bay. Polar Notes (Dartmouth College) 9:1–25.

Renaud, W.E.; Bradstreet, M.S.W. 1980. Late winter distribution of black guillemots in northern Baffin Bay and the Canadian High Arctic. Can. Field-Nat. 94:421–425.

Renaud, W.E.; McLaren, P.L.; Johnson, S.R. 1982. The Dovekie, *Alle alle*, a spring migrant to eastern Lancaster Sound and western Baffin Bay. Arctic 35:118–125.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Robards, M.; Gilchrist, H.G.; Allard, K. 2000. Breeding Atlantic puffins, *Fratercula arctica*, and other bird species of Coburg Island, Nunavut. Can. Field-Nat. 114:72–77.

Roby, D.D.; Brink, K.L.; Nettleship, D.N. 1981. Measurements, chick meals and breeding distribution of Dovekies (*Alle alle*) in northwest Greenland. Arctic 34:241–248.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Steffen, K. 1985. Warm water cells in the North Water, northern Baffin Bay during winter. J. Geophys. Res. 90:9129–9136.

Stirling, I. 1980. The biological importance of polynyas in the Canadian Arctic. Arctic 33:303–315.

Stirling, I.; Cleator, H.; Smith, T.G. 1981. The mammals. Pages 45–58 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Thomas, V.G.; MacDonald, S.D. 1987. The breeding distribution and current population status of the ivory gull in Canada. Arctic 43:211–218.

Tooma, S. 1978. Summer circulation patterns, northern Smith Sound. Arctic 31:85–96.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

2 – Seymour Island

Location: 76°48'N, 101°16'W

Size: Marine – 2617 km^2; terrestrial – 330 km^2

Description: Seymour Island is located approximately 30 km north of Bathurst Island, in the Berkeley group of islands. It is less than 3 km long and rises only 28 m out of the pack ice. This terrestrial habitat site is described in Alexander et al. (1991).

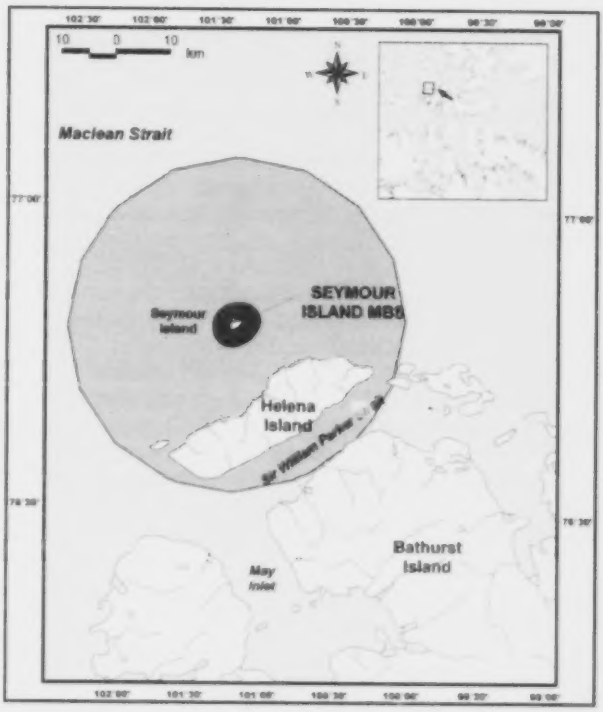
Seymour Island lies in the High Arctic oceanographic zone (Nettleship and Evans 1985). Water currents flow south through Maclean Strait and into Penny Strait. Because of strong currents and shallow waters, polynyas develop in nearby Penny Strait. Freeze-up in this region usually occurs by early October, but open water appears near Dundas Island in January and reaches maximum extent in late April or early May (Smith and Rigby 1981). Breakup begins in June, but the area remains ice-jammed through July.

Biological value: Seymour Island is Canada's largest known breeding colony of Ivory Gulls *Pagophila eburnea*, a species at risk in Canada. This site supports an estimated 200–250 adults (100–125 pairs) (Haney and MacDonald 1995), about 10% of the known Canadian population. They occupy this site from the end of May to September (Thomas and MacDonald 1987).

Sensitivities: Seabirds are sensitive to disturbance at their colonies and to the pollution of offshore waters. The Ivory Gull is also a species at risk in Canada, currently assessed as "Special Concern."

Potential conflicts: The Sverdrup Basin has been explored for hydrocarbons and maintains potential as a future area of drilling. Oil spills associated with drilling or disturbance associated with exploration (ships or aircraft) could endanger seabirds and pollute their feeding areas.

Status: Seymour Island is part of the International Biological Programme (Region 9, Site No. 1-7; Nettleship 1980) and an Important Bird Area in Canada (NU045; CEC 1999). It is a Migratory Bird Sanctuary, established in 1975, and includes waters 3.2 km from the high tide line.



References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Haney, J.C.; MacDonald, S.D. 1995. Ivory Gull (*Pagophila eburnea*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 175. The Birds of North America, Inc., Philadelphia.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Thomas, V.G.; MacDonald, S.D. 1987. The breeding distribution and current population status of the ivory gull in Canada. Arctic 43:211–218.

Location: 76°25'N, 90°00'W

Size: Marine – 2817 km^2; terrestrial – 610 km^2

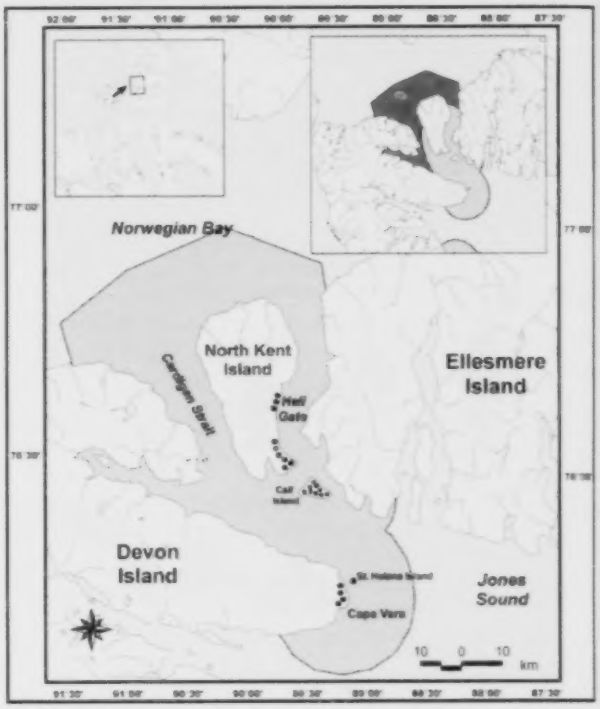
Description: Hell Gate and Cardigan Strait are narrow passages between North Kent, northern Devon, and southwestern Ellesmere islands through which strong currents flow from Norwegian Bay to Jones Sound. A recurring polynya occurs here because of these strong currents (Smith and Rigby 1981). A description of key terrestrial sites around this marine area is given in Alexander et al. (1991).

This marine area is located in the High Arctic oceanographic zone (Nettleship and Evans 1985). Freeze-up in the bays and fjords normally occurs in September. Throughout October and November, Hell Gate and Cardigan Strait are covered with ice, although the ice appears to remain mobile. Open water usually reappears in early December, on either side of North Kent Island. From December until July, open water remains, with the maximum extent occurring in May, June, and July. In July, breakup normally occurs in Norwegian Bay, and ice flowing south tends to block Hell Gate and Cardigan Strait. As a result, the area does not usually become completely ice-free in summer (Smith and Rigby 1981).

Biological value: Several major seabird colonies occur in this area. The most numerous seabirds in the area are probably Black Guillemots *Cepphus grylle*, which occur here year-round, with the greatest numbers between May and September. Sverdrup (1904) observed "myriads" of these birds in March, and Renaud and Bradstreet (1980) noted some birds overwintering in the area. More recent surveys have yielded substantially different estimates of local Black Guillemot populations in the area. Nettleship (1974, 1980) provided provisional estimates of approximately 8000 pairs distributed across North Kent and Calf islands. However, a survey in the early 1980s indicated roughly 1100 birds across these same sites (Alexander et al. 1991). Hence, estimated populations of guillemots in this area represent between 0.5 and 8% of the Canadian population.

An estimated 7500 pairs of Northern Fulmars *Fulmarus glacialis*, about 3% of the Canadian population, nest at Cape Vera at the eastern entrance to Cardigan Strait (Alexander et al. 1991). However, a more recent publication lists the estimated colony size at 50 000 individuals (Hatch and Nettleship 1998). Further studies are needed to explain the discrepancies in these estimates. Fulmars arrive by early May, and numbers peak by about 10 May. The numbers decline until the end of May, and the colony is reoccupied by the first week of June. While in the area, fulmars concentrate at fast ice edges and later at glacier discharge sites. The young fledge in September, and the birds depart by late October.

Approximately 300 pairs of Common Eiders *Somateria mollissima borealis* nest at St. Helena Island, and another 160 pairs nest by Calf Island (Prach et al. 1986). Glaucous Gulls *Larus hyperboreus*, Thayer's Gulls *Larus glaucoides thayeri*, and Arctic Terns *Sterna paradisaea* also nest at these sites. In 2002, approximately 600 moulting High Arctic Brant *Branta bernicla* were observed on the beach below Cape Vera (H.G. Gilchrist and M.L. Mallory, unpubl. data).



The area, particularly the polynya, supports many other marine species, including ringed seal *Phoca hispida*, bearded seal *Erignathus barbatus*, narwhal *Monodon monoceros*, beluga *Delphinapterus leucas*, polar bear *Ursus maritimus*, and walrus *Odobenus rosmarus* (Stirling and Cleator 1981; Riewe 1992).

Sensitivities: Seabirds are heavily dependent upon ice edge habitats for feeding and resting. Accordingly, they are sensitive to disturbance or pollution of these sites.

Potential conflicts: None.

Status: Cape Vera, North Kent Island, and Calf Island are International Biological Programme sites (Region 9, Site Nos. 2-11 and 2-10; Nettleship 1980) and Important Bird Areas in Canada (NU052, NU053; CEC 1999).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Hatch, S.A.; Nettleship, D.N. 1998. Northern Fulmar (*Fulmarus glacialis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 361. The Birds of North America Inc., Philadelphia.

Nettleship, D.N. 1974. Seabird colonies and distribution around Devon Island and vicinity. Arctic 27:95–103.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Prach, R.W.; Boyd, H.; Cooch, F.G. 1981. Polynyas and sea ducks. Pages 67–70 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Prach, R.W.; Smith, A.R.; Dzubin, A. 1986. Nesting of the common eider near the Hell Gate – Cardigan Strait polynya, 1980–1981. Pages 127–135 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Renaud, W.E.; Bradstreet, M.S.W. 1980. Late winter distribution of black guillemots in northern Baffin Bay and the Canadian high arctic. Can. Field-Nat. 94:421–425.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Stirling, I.; Cleator, H. (eds.). 1981. Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Sverdrup, O.N. 1904. New land: four years in the arctic regions. Vol. 2. Longmans, Green, London, U.K. 504 pp.

4 – Queens Channel

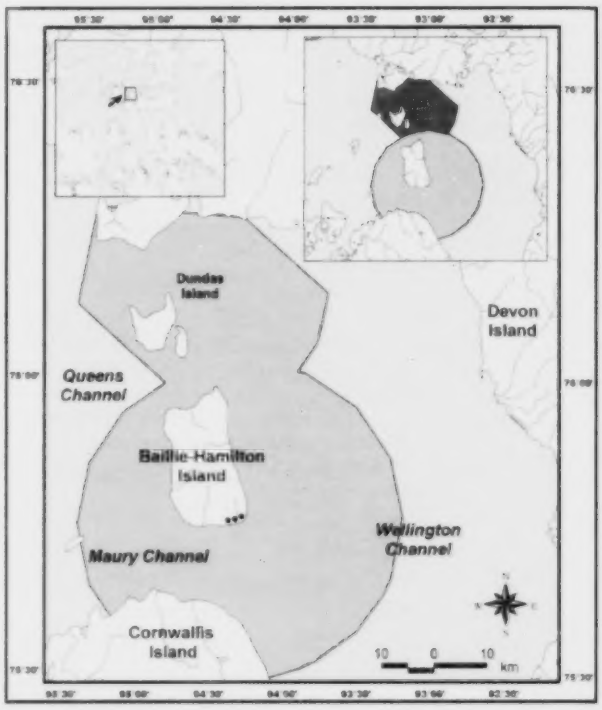
Location: 76°00'N, 95°30'W

Size: Marine – 3247 km^2; terrestrial – 341 km^2

Description: Queens Channel is the water body located between Cornwallis Island and the Grinnell Peninsula of northwestern Devon Island. Water flows south from Penny Strait through Queens Channel and Wellington Channel to Lancaster Sound. Two key terrestrial habitat sites (Baillie-Hamilton and Cheyne islands) occur in this marine region (Alexander et al. 1991).

This marine area is situated in the High Arctic oceanographic zone (Nettleship and Evans 1985). A polynya system occurs in the vicinity of Dundas Island and Penny Strait. Freeze-up usually occurs during late September or early October in Penny Strait, Queens Channel, and McDougall Sound. Within 2 weeks, Wellington Channel and the area around Dundas and Baillie-Hamilton islands also freeze. In January, an area of open water appears in Couch Passage between Dundas Island and Baillie-Hamilton Island or in Pioneer Channel between Dundas Island and Shiells Peninsula. By late April or early May, the waters between these landmasses remain partially open. Breakup begins in June, and ice usually disappears by early to mid-July (Smith and Rigby 1981).

Several small polynyas develop in May or early June along the eastern side of Penny Strait. Although these polynyas may not open early, they precede breakup and seem to occupy a constant location from year to year. The separate patches of open water coalesce until the whole strait is clear of ice, usually in mid-June. By late June or mid-July, the open waters of Penny Strait link up with the open water around Dundas Island, which joins the open water of Wellington Channel between mid-July and mid-August (Smith and Rigby 1981).



Biological value: Two important seabird colonies occur within this area. The Cheyne Islands support the largest known nesting population of Ross' Gull *Rhodostethia rosea* (a species at risk in Canada) in the Canadian Arctic. In 1976, three pairs nested on the islands, and in 1978, six pairs were noted among approximately 20 birds that were present (Macey 1981). The latter count represents approximately 60% of the Canadian population (although very few nests have been found in Canada). However, no birds were observed in July 2002 (H.G. Gilchrist and M.L. Mallory, unpubl. data), suggesting that annual use of the site varies, perhaps in relation to annual ice conditions. Common Eiders *Somateria mollissima borealis* also nest on the Cheyne Islands; 164 nests were found in 2002 (H.G. Gilchrist and M.L. Mallory, unpubl. data). Approximately 3000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, representing nearly 1% of the Canadian population, nest on the cliffs of southeastern Baillie-Hamilton Island at Washington Point (Nettleship 1980). In June 1974, the coasts of Margaret Island and the southeast coast of Dundas Island were used by 1100 Common Eiders and King Eiders *Somateria spectabilis*, while over 2200 Common Eiders and approximately 650 King Eiders were observed in open water of Queens Channel (Davis et al. 1974). The Common Eiders represent a little under 1% of the Canadian *S. m. borealis* population, and this is one of the most northern concentrations. A few Black Guillemots *Cepphus grylle* may overwinter in the polynyas: 15 were seen north of Dundas Island in April 1977 (Renaud and Bradstreet 1980).

Kittiwakes arrive at the nesting cliffs about mid-May and leave by early October. Ross' Gulls arrive at their breeding grounds in June (Macey 1981) but probably are present earlier. As both kittiwakes and Ross' Gulls are dependent on ice edge habitats (Sekarak and Richardson 1978; Macey 1981), polynyas and open leads are critical to these species. Their distribution and concentrations are dependent on the prevailing ice conditions.

Queens Channel is also an important region for walrus *Odobenus rosmarus*, bearded seal *Erignathus barbatus*, ringed seal *Phoca hispida*, and polar bear *Ursus maritimus*. All of these species may overwinter near the polynyas (Riewe 1992).

Sensitivities: Concentrations of marine birds are sensitive to disturbances and the degradation of their marine habitats.

Potential conflicts: None.

Status: Washington Point is an International Biological Programme site (Region 9, Site No. 1-10; Nettleship 1980), and Washington Point and the Cheyne Islands are Important Bird Areas in Canada (NU049, NU051; CEC 1999).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Davis, R.A.; Bradstreet, M.S.W.; Holdsworth, C.; McLaren, P.; Richardson, W.J. 1974. Studies on the number and distribution of birds in the central Canadian Arctic — 1974: a preliminary report. Vols. 1 and 2. Unpublished report, LGL Ltd. environmental research associates for Polar Gas Project, Toronto. 238 pp.

Macey, A. 1981. Status report on Ross' gull, *Rhodostethia rosea*, in Canada, 1980. Unpublished report, Committee on the Status of Endangered Wildlife in Canada, Ottawa. 55 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Renaud, W.E.; Bradstreet, M.S.W. 1980. Late winter distribution of Black Guillemots in northern Baffin Bay and the Canadian High Arctic. Can. Field-Nat. 94:421–425.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Sekarak, A.D.; Richardson, W.J. 1978. Studies of the ecology of fast-ice edges in the High Arctic. Unpublished report, LGL Ltd. environmental research associates for Polar Gas Project, Toronto. 92 pp.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

5 – Skruis Point

Location: 75°40'N, 88°43'W

Size: Marine – 1204 km^2; terrestrial – 0 km^2

Description: Skruis Point lies midway along the north coast of Devon Island, on the southern part of Jones Sound, and is southeast of the Hell Gate and Cardigan Strait key marine habitat site (site 3). A description of key terrestrial sites around this marine area is given in Alexander et al. (1991).

This marine area is located in the High Arctic oceanographic zone (Nettleship and Evans 1985). Freeze-up in the bays and fjords normally occurs in September, with much of Jones Sound frozen by late October. Open water can be found in the polynya at Cardigan Strait from December through July. Some leads develop in May, and breakup progresses through July (Smith and Rigby 1981).

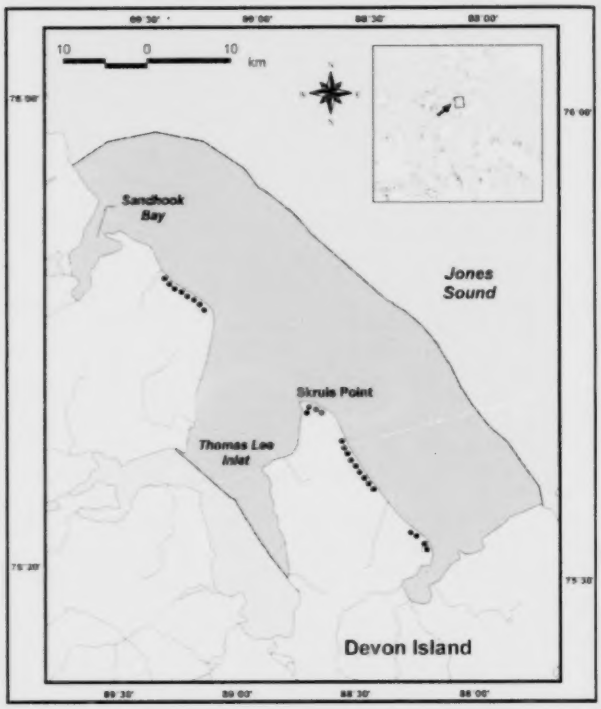
Biological value: Skruis Point was reported to have Canada's largest colony of Black Guillemots *Cepphus grylle*, estimated at 10 000 pairs based on a 1973 survey (Nettleship 1974), or approximately 10% of the Canadian population. Surveys in the mid-1980s found 1585 and 700 birds in two different years, representing at best 1% of the Canadian population (Alexander et al. 1991). A more detailed survey is required to explain these discrepancies.

The area, and particularly the polynya, supports many other marine species, including ringed seal *Phoca hispida*, bearded seal *Erignathus barbatus*, narwhal *Monodon monoceros*, beluga *Delphinapterus leucas*, polar bear *Ursus maritimus*, and walrus *Odobenus rosmarus* (Stirling and Cleator 1981; Riewe 1992).

Sensitivities: Seabirds are heavily dependent upon ice edge habitats for feeding and resting. Accordingly, they are sensitive to disturbance or the pollution of these sites.

Potential conflicts: None.

Status: Skruis Point is an International Biological Programme site (Region 9, Site No. 2-17; Nettleship 1980) and an Important Bird Area site in Canada (NU054; CEC 1999).



References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Nettleship, D.N. 1974. Seabird colonies and distribution around Devon Island and vicinity. Arctic 27:95–103.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

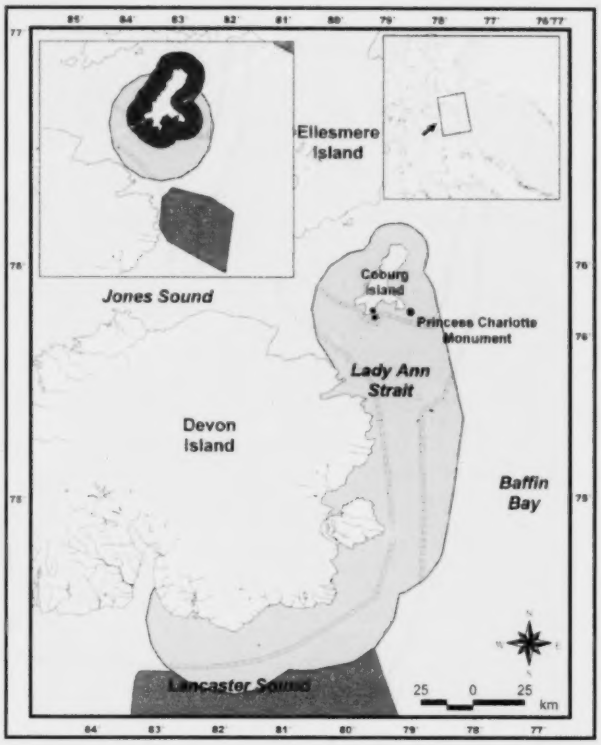
Stirling, I.; Cleator, H. (eds.). 1981. Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Location: 75°35'N, 80°00'W

Size: Marine – 11 647 km^2; terrestrial – 337 km^2

Description: Eastern Jones Sound and Lady Ann Strait form the marine area between southern Ellesmere Island, Coburg Island, and northeastern Devon Island. Key terrestrial sites in this area include Coburg Island and eastern Devon Island (Alexander et al. 1991).

Eastern Jones Sound resides in the High Arctic oceanographic zone (Nettleship and Evans 1985). A recurrent area of open water occurs in the vicinity of Coburg Island. This polynya remains as a separate feature for some months before joining the North Water Polynya in May or June. Freeze-up occurs in late September or early October, beginning in Jones Sound and encompassing Coburg Island by mid- to late October. Open water appears in January, southwest of Coburg Island, and remains all winter. Leads may extend northeast to the North Water Polynya or south towards Lancaster Sound, usually connecting to the latter by April. The North Water Polynya extends south past Coburg Island by mid-May or early June (Smith and Rigby 1981).



Biological value: Over 500 000 breeding marine birds are found in this area, with significant concentrations distributed throughout the region, depending on the annual patterns of ice breakup and the distribution of prey (McLaren and Renaud 1979, 1982). Approximately 30 000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, representing 16% of the Canadian population, nest at Cambridge Point, Coburg Island. This is the largest colony of this species in Nunavut (Nettleship 1980). These cliffs also support 12% (160 000 pairs) of the Thick-billed Murres *Uria lomvia* in Canada. An estimated 3000 pairs (1% of the Canadian population) of Northern Fulmars *Fulmarus glacialis* breed on Princess Charlotte Monument (Nettleship 1980). Four colonies of Ivory Gulls *Pagophila eburnea*, a species at risk in Canada, are located on eastern Devon Island, where 91 pairs (4% of the Canadian population) were found in 1982 (Frisch 1983). Black Guillemots *Cepphus grylle* (175 pairs) and Glaucous Gulls *Larus hyperboreus* (60–80 pairs) nest in the area (Robards et al. 2000). Bays at the south end of Coburg Island are used by moulting eiders and Long-tailed Ducks *Clangula hyemalis*, and a few Common Eiders *Somateria mollissima borealis* breed in the area (Robards et al. 2000). This is one of the few known breeding sites for Atlantic Puffins *Fratercula arctica* in Nunavut, with a colony recently estimated at 14 pairs (Robards et al. 2000).

Outside the breeding season, this area also supports large numbers of seabirds. In late winter (March–April), thousands of guillemots forage along ice edges and in pack ice of Glacier Strait, eastern Devon Island, and eastern Jones Sound (Renaud and Bradstreet 1980). In spring, the ice edge along Devon and Ellesmere islands supports thousands of fulmars, kittiwakes, murres, and guillemots, with the latter two species also occurring commonly in offshore areas of moderate to heavy pack ice (McLaren 1982). In late summer (August–October 1978), approximately 8000 fulmars and 11 500 Black-legged Kittiwakes were observed along the coastal areas of eastern Devon and southern Ellesmere islands (McLaren and Renaud 1979, 1982). Densities of both species were much higher along edges of glaciers than off the regular coastline. Birds arrive by early to mid-May and concentrate along ice edges until the ice disintegrates in early August. Thick-billed Murres are commonly seen along the fast-ice edges, at Cambridge Point, and in the offshore waters south of Cambridge Point. In early July 1978, almost 20 000 murres were recorded along the Jones Sound and Glacier Strait ice edges and in the nearshore waters south of Coburg Island (McLaren and Renaud 1979).

Northern Fulmars arrive by late April and disperse throughout the area. They abandon their colonies briefly during late May and move out of the area, returning by early June. Large flocks occur along the ice edges northeast of Coburg Island, along southeastern Ellesmere Island, and along east Devon Island. About 3000 fulmars were seen in this area during late August 1978 (McLaren and Renaud 1979). Most birds have left the area by early October.

Although large numbers of fulmars and kittiwakes occur along the coasts of Devon and Ellesmere islands, densities are significantly higher at glacier fronts, where concentrations of Glaucous Gulls and Ivory Gulls also occur (McLaren and Renaud 1979; Renaud and McLaren 1982).

In June 1978, over 2500 Long-tailed Ducks were observed, primarily along the southwest coast of Coburg Island and along the Jones Sound ice edge. Over 700 Common Eiders *S. m. borealis* were observed along the coast of Coburg Island during the same period (McLaren and Renaud 1979).

Eastern Jones Sound is an important maternity area for polar bears *Ursus maritimus* and a summer area for seals,

Location: 75°35'N, 80°00'W

Size: Marine 11 647 km²; terrestrial 337 km²

Description: Eastern Jones Sound and Lady Ann Strait form the marine area between southern Ellesmere Island, Coburg Island, and northeastern Devon Island. Key terrestrial sites in this area include Coburg Island and eastern Devon Island (Alexander et al. 1991).

Eastern Jones Sound resides in the High Arctic oceanographic zone (Nettleship and Evans 1985). A recurrent area of open water occurs in the vicinity of Coburg Island. This polynya remains as a separate feature for some months before joining the North Water Polynya in May or June. Freeze-up occurs in late September or early October, beginning in Jones Sound and encompassing Coburg Island by mid- to late October. Open water appears in January, southwest of Coburg Island, and remains all winter. Leads may extend northeast to the North Water Polynya or south towards Lancaster Sound, usually connecting to the latter by April. The North Water Polynya extends south past Coburg Island by mid-May or early June (Smith and Rigby 1981).

Biological value: Over 500 000 breeding marine birds are found in this area, with significant concentrations distributed throughout the region, depending on the annual patterns of ice breakup and the distribution of prey (McLaren and Renaud 1979, 1982). Approximately 30 000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, representing 16% of the Canadian population, nest at Cambridge Point, Coburg Island. This is the largest colony of this species in Nunavut (Nettleship 1980). These cliffs also support 12% (160 000 pairs) of the Thick-billed Murres *Uria lomvia* in Canada. An estimated 3000 pairs (1% of the Canadian population) of Northern Fulmars *Fulmarus glacialis* breed on Princess Charlotte Monument (Nettleship 1980). Four colonies of Ivory Gulls *Pagophila eburnea*, a species at risk in Canada, are located on eastern Devon Island, where 91 pairs (4% of the Canadian population) were found in 1982 (Frisch 1983). Black Guillemots *Cepphus grylle* (175 pairs) and Glaucous Gulls *Larus hyperboreus* (60–80 pairs) nest in the area (Robards et al. 2000). Bays at the south end of Coburg Island are used by moulting eiders and Long-tailed Ducks *Clangula hyemalis*, and a few Common Eiders *Somateria mollissima borealis* breed in the area (Robards et al. 2000). This is one of the few known breeding sites for Atlantic Puffins *Fratercula arctica* in Nunavut, with a colony recently estimated at 14 pairs (Robards et al. 2000).

Outside the breeding season, this area also supports large numbers of seabirds. In late winter (March–April), thousands of guillemots forage along ice edges and in pack ice of Glacier Strait, eastern Devon Island, and eastern Jones Sound (Renaud and Bradstreet 1980). In spring, the ice edge along Devon and Ellesmere islands supports thousands of fulmars, kittiwakes, murres, and guillemots, with the latter two species also occurring commonly in offshore areas of moderate to heavy pack ice (McLaren 1982). In late summer (August–October 1978), approximately 8000 fulmars and 11 500 Black-legged Kittiwakes were observed along the coastal areas of eastern Devon and southern Ellesmere islands (McLaren and Renaud 1979, 1982). Densities of both species were much higher along edges of glaciers than off the regular coastline. Birds arrive by early to mid-May and concentrate along ice edges until the ice disintegrates in early August. Thick-billed Murres are commonly seen along the fast-ice edges, at Cambridge Point, and in the offshore waters south of Cambridge Point. In early July 1978, almost 20 000 murres were recorded along the Jones Sound and Glacier Strait ice edges and in the nearshore waters south of Coburg Island (McLaren and Renaud 1979).

Northern Fulmars arrive by late April and disperse throughout the area. They abandon their colonies briefly during late May and move out of the area, returning by early June. Large flocks occur along the ice edges northeast of Coburg Island, along southeastern Ellesmere Island, and along east Devon Island. About 3000 fulmars were seen in this area during late August 1978 (McLaren and Renaud 1979). Most birds have left the area by early October.

Although large numbers of fulmars and kittiwakes occur along the coasts of Devon and Ellesmere islands, densities are significantly higher at glacier fronts, where concentrations of Glaucous Gulls and Ivory Gulls also occur (McLaren and Renaud 1979, Renaud and McLaren 1982).

In June 1978, over 2500 Long-tailed Ducks were observed, primarily along the southwest coast of Coburg Island and along the Jones Sound ice edge. Over 700 Common Eiders *S. m. borealis* were observed along the coast of Coburg Island during the same period (McLaren and Renaud 1979).

Eastern Jones Sound is an important maternity area for polar bears *Ursus maritimus* and a summer area for seals.

narwhal *Monodon monoceros*, and walruses *Odobenus rosmarus* (Riewe 1992).

Sensitivities: Seabirds are sensitive to disturbances at their breeding cliffs and to pollution of their staging and foraging areas.

Potential conflicts: This area is of increasing importance as a tourist destination for cruise ships and small aircraft (Hall and Johnston 1995; Wakelyn 2001).

Status: Coburg Island is an International Biological Programme site (Region 9, Site No. 2-12; Nettleship 1980), and Coburg Island was protected in 1995 as Nirjutiqavvik National Wildlife Area, which includes waters within 10 km of the high tide line. Coburg Island and the Devon Island Nunataks (Ivory Gull colonies) are Important Bird Areas in Canada (NU010, NU057; CEC 1999).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Frisch, T. 1983. Ivory gull colonies on the Devon Island ice cap, Arctic Canada. Arctic 36:370–371.

Hall, C.M.; Johnston, M.E. 1995. Polar tourism: tourism in the Arctic and Antarctic regions. Wiley & Sons, New York.

McLaren, P.L. 1982. Spring migration and habitat use by seabirds in eastern Lancaster Sound and western Baffin Bay. Arctic 35:88–111.

McLaren, P.L.; Renaud, W.E. 1979. Distribution of sea-associated birds in northwest Baffin Bay and adjacent waters, May–October 1978. Vols. 1 and 2. Unpublished report, LGL Ltd. environmental research associates for Petro-Canada, Calgary. 312 pp.

McLaren, P.L.; Renaud, W.E. 1982. Seabird concentrations in late summer along the coasts of Devon and Ellesmere islands, N.W.T. Arctic 35:112–117.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Renaud, W.E.; Bradstreet, M.S.W. 1980. Late winter distribution of black guillemots in northern Baffin Bay and the Canadian High Arctic. Can. Field-Nat. 94:421–425.

Renaud, W.E.; McLaren, P.L. 1982. Ivory Gull (*Pagophila eburnea*) distribution in late summer and autumn in eastern Lancaster Sound and western Baffin Bay. Arctic 35:141–148.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Robards, M.; Gilchrist, H.G.; Allard, K. 2000. Breeding Atlantic puffins, *Fratercula arctica*, and other bird species of Coburg Island, Nunavut. Can. Field-Nat. 114:72–77.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

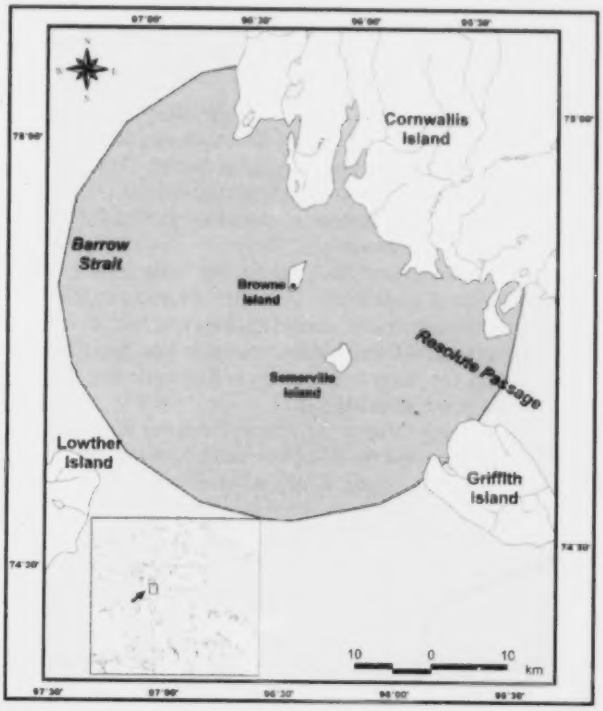
7 – Browne Island

Location: 74°49'N, 96°21'W

Size: Marine – 2174 km^2; terrestrial – 12 km^2

Description: Browne Island is located in western Barrow Strait about 12 km southwest of Cornwallis Island and is less than 50 km away from Resolute Bay (Qausuittuq). This key terrestrial habitat site is described in Alexander et al. (1991).

Browne Island lies in the High Arctic oceanographic zone (Nettleship and Evans 1985), near the annual boundary between consolidated and unconsolidated ice in Barrow Strait. Ice around Browne Island breaks up usually by late August each year, although 1 month earlier less than 50 km east (Dickins et al. 1990). Open water (<40% ice cover) is available only for about 5 weeks each year, with freeze-up beginning in early October. Mean tides around Browne Island are 1.2 m, and water currents typically flow easterly.



Biological value: In 1974, Browne Island supported a colony of approximately 2000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, or approximately 1% of the Canadian population. However, in 1975, only 500 pairs were present, perhaps related to a late ice year (Alliston et al. 1976). Further studies are needed. Thayer's Gulls *Larus glaucoides thayeri* and Glaucous Gulls *Larus hyperboreus* nest on the island in small numbers (Alliston et al. 1976). Kittiwakes use the area between mid-May and late September.

The most abundant marine mammals in the area are ringed seals *Phoca hispida*, with occasional polar bears *Ursus maritimus* (Dickins et al. 1990; Riewe 1992).

Sensitivities: The waters around Browne Island are considered to be "moderately sensitive" to risk of oil spills from May through early October (Dickins et al. 1990). Seabirds are sensitive to disturbance at their colonies and to the pollution of offshore waters.

Potential conflicts: None.

Status: Browne Island is a key terrestrial habitat site (Alexander et al. 1991).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Alliston, W.G.; Bradstreet, M.S.W.; McLaren, M.A.; Davis, R.A.; Richardson, W.J. 1976. Numbers and distributions of birds in the central District of Franklin, NWT, June–August, 1975. Vols. 1 and 2. Unpublished report, LGL Ltd. environmental research associates for Polar Gas Project, Toronto. 583 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

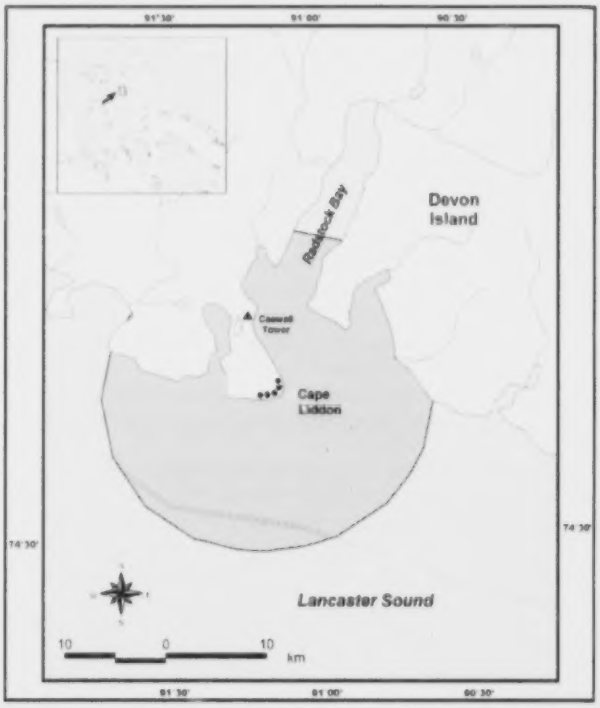
Location: 74°37'N, 91°10'W

Size: Marine – 586 km^2; terrestrial – 0 km^2

Description: Cape Liddon is a promontory that juts into Barrow Strait on the west side of Radstock Bay, southwest Devon Island, in western Lancaster Sound. The marine area is part of the High Arctic oceanographic zone (Nettleship and Evans 1985). Terrestrial characteristics of the island are described in Alexander et al. (1991).

Mean tides at the Cape are approximately 1.7 m, with 7–9 weeks of open water. This part of Lancaster Sound is usually ice-covered by early October, and normal ice breakup around Cape Liddon occurs in late July (Dickins et al. 1990). Ice cover may remain in Radstock Bay in August (Gaston and Nettleship 1981).

Strong currents flow south from the Wellington Channel and west from Barrow Strait along the southern coast of Devon Island, with a substantial water transfer south into Prince Regent Inlet. The major current interactions around Prince Leopold Island are thought to create local enrichment of nutrients, enhancing phytoplankton growth and resulting in highly suitable conditions for seabirds (Gaston and Nettleship 1981).



Biological value: Cape Liddon supports up to 10 000 pairs of Northern Fulmars *Fulmarus glacialis*, about 4% of the Canadian population (Hatch and Nettleship 1998), but the estimates have varied between 1000 and 10 000 pairs (Nettleship 1980; Alexander et al. 1991). Fulmars use Cape Liddon between April and early October. About 100 pairs of Black Guillemots *Cepphus grylle* nest around Cape Liddon.

Radstock Bay is an area where Northern Fulmars, Thick-billed Murres *Uria lomvia*, Black-legged Kittiwakes *Rissa tridactyla*, and Black Guillemots congregate between August and October (Fisheries and Oceans Canada 1999). The waters around Cape Liddon are an important feeding area for alcids nesting elsewhere in western Lancaster Sound, notably from Prince Leopold Island (Bradstreet 1979, 1980; Gaston and Nettleship 1981).

The waters around Cape Liddon are also important for marine mammals, notably beluga *Delphinapterus leucas* and polar bear *Ursus maritimus* (Schweinsburg et al. 1982; Dickins et al. 1990; Riewe 1992; Fisheries and Oceans Canada 1999). There are walrus *Odobenus rosmarus* haul-outs, and this is an important hunting area for the community of Resolute Bay, particularly for polar bears (Fisheries and Oceans Canada 1999). The southern shore of Devon Island (within 400 m of the tide line) is an important beluga migration route.

Sensitivities: The waters around Cape Liddon are considered to be of "moderate sensitivity" for oil spills, and Radstock Bay is of "high sensitivity" for oil spills (Dickins et al. 1990).

Potential conflicts: Lancaster Sound, Barrow Strait, and Prince Regent Inlet have potential to become marine shipping routes and areas of hydrocarbon exploration and development (DIAND 1982). This area is also of increasing importance as a tourist destination for cruise ships (Hall and Johnston 1995; Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Cape Liddon is part of the International Biological Programme (Region 9, Site No. 2-15; Nettleship 1980) and is an Important Bird Area in Canada (NU059; CEC 1999).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Bradstreet, M.S.W. 1979. Thick-billed murres and black guillemots in the Barrow Strait area, N.W.T., during spring: distribution and habitat use. Can. J. Zool. 57:1789–1802.

Bradstreet, M.S.W. 1980. Thick-billed murres and black guillemots in the Barrow Strait area, N.W.T., during spring: diets and food availability along ice edges. Can. J. Zool. 58:2120–2140.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

DIAND. 1982. The Lancaster Sound Region: 1980–2000. Green Paper, Department of Indian Affairs and Northern Development, Ottawa. 102 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Fisheries and Oceans Canada. 1999. Marine environmental handbook — Arctic and Northwest Passage. Fisheries and Oceans Canada, Ottawa. 136 pp.

Gaston, A.J.; Nettleship, D.N. 1981. The thick-billed murres of Prince Leopold Island. Can. Wildl. Serv. Monogr. No. 6. 350 pp.

Hall, C.M.; Johnston, M.E. 1995. Polar tourism: tourism in the Arctic and Antarctic regions. Wiley & Sons, New York.

Hatch, S.A.; Nettleship, D.N. 1998. Northern Fulmar (*Fulmarus glacialis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 361. The Birds of North America Inc., Philadelphia.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Schweinsburg, R.E.; Lee, L.J.; Latour, P. 1982. Distribution, movement, and abundance of polar bears in Lancaster Sound, Northwest Territories. Arctic 35:159–169.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

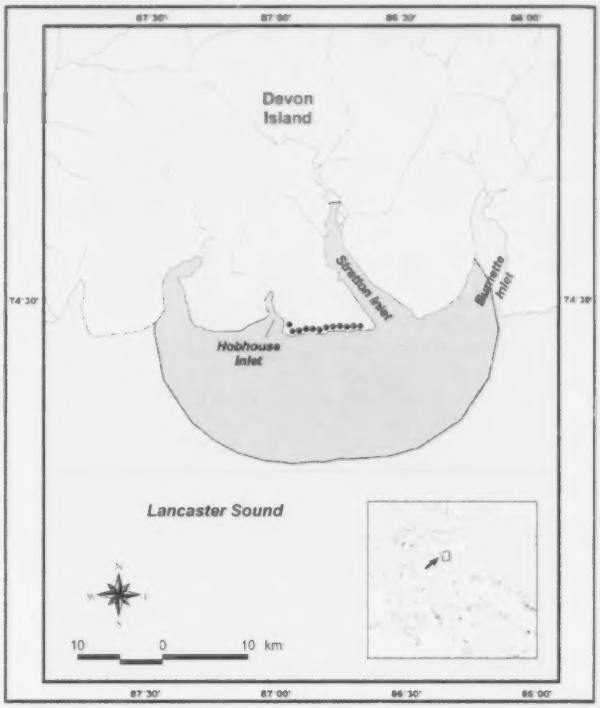
Location: 74°28'N, 86°50'W

Size: Marine – 610 km^2; terrestrial – 0 km^2

Description: Hobhouse Inlet is located along the indented southern coast of Devon Island in central Lancaster Sound, 60 km east of Maxwell Bay, due north of the Brodeur Peninsula, and approximately 130 km northeast of Prince Leopold Island. This region is part of the High Arctic oceanographic zone (Nettleship and Evans 1985). The terrestrial characteristics of Hobhouse Inlet are described in Alexander et al. (1991).

Mean tides are approximately 1.7 m, with 16 weeks of open water along southern Devon Island. Lancaster Sound around Hobhouse Inlet is usually ice-covered by mid-October. In normal years, leads open in the ice beginning in April. As breakup continues, an eastward edge of fast ice often extends from Prince Leopold Island to Maxwell Bay on Devon Island (Smith and Rigby 1981); infrequently, it extends from the vicinity of Hobhouse Inlet to the Brodeur Peninsula (Dickins et al. 1990). Normal ice breakup around Hobhouse Inlet occurs around 11 June (Dickins et al. 1990).

Strong currents flow west from Barrow Strait along the southern coast of Devon Island, with a substantial water transfer south into Prince Regent Inlet. The major current interactions around Prince Leopold Island are thought to create local enrichment of nutrients and subsequent enhanced phytoplankton growth, with consequent effects up the food chain, resulting in highly suitable conditions for seabirds (Gaston and Nettleship 1981).



Biological value: Hobhouse Inlet supports one of Canada's largest Northern Fulmar *Fulmarus glacialis* colonies, variously estimated at 10 000–75 000 pairs (Alexander et al. 1991), representing anywhere from 4 to 32% of the Canadian population. Recent estimates suggest that the colony is about 25 000 pairs (Hatch and Nettleship 1998), corresponding to 11% of the national population. Smaller numbers of Glaucous Gulls *Larus hyperboreus* and Black Guillemots *Cepphus grylle* also occur here (Nettleship 1980).

This marine region is occupied by seabirds generally from early May to the end of September. Significant concentrations of marine birds may be distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (Gaston and Nettleship 1981; Riewe 1992). Aside from the fulmar colony, alcids that breed in Lancaster Sound forage in the waters around Hobhouse Inlet (Gaston and Nettleship 1981). The area is particularly important for birds staged in leads that open up along southern Devon Island during spring breakup. Interface habitats (along shorelines or ice edges) are key locations for alcids foraging for Arctic cod *Boreogadus saida* and various epontic invertebrates (Bradstreet 1979, 1980). Some murres from the colonies on Prince Leopold Island forage as far away as south-central Devon Island during the breeding season (Gaston and Nettleship 1981).

The marine area around Hobhouse Inlet is also important for certain mammals, especially beluga *Delphinapterus leucas* and polar bear *Ursus maritimus* (Schweinsburg et al. 1982; Dickins et al. 1990). Some walrus *Odobenus rosmarus* haul-outs occur nearby, and hunters from Resolute Bay may use this area to hunt polar bears along the landfast ice edge (Riewe 1992; Fisheries and Oceans Canada 1999).

Sensitivities: The waters along southern Devon Island are ranked as being of "high sensitivity" to effects of oil spills from early May through late October (Dickins et al. 1990). Seabirds are sensitive to disturbance at their colonies and to the pollution of offshore waters.

Potential conflicts: Lancaster Sound, Barrow Strait, and Prince Regent Inlet have potential to become marine shipping routes and areas of hydrocarbon exploration and development (DIAND 1982). This area is also of increasing importance as a tourist destination for cruise ships (Hall and Johnston 1995; Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Hobhouse Inlet is identified in the International Biological Programme (Region 9, Site No. 2-16; Nettleship 1980) and is an Important Bird Area in Canada (NU060; CEC 1999).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Bradstreet, M.S.W. 1979. Thick-billed murres and black guillemots in the Barrow Strait area, N.W.T., during spring: distribution and habitat use. Can. J. Zool. 57:1789–1802.

Bradstreet, M.S.W. 1980. Thick-billed murres and black guillemots in the Barrow Strait area, N.W.T., during spring: diets and food availability along ice edges. Can. J. Zool. 58:2120–2140.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

DIAND. 1982. The Lancaster Sound Region: 1980–2000. Green Paper, Department of Indian Affairs and Northern Development, Ottawa. 102 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Fisheries and Oceans Canada. 1999. Marine environmental handbook — Arctic and Northwest Passage. Fisheries and Oceans Canada, Ottawa. 136 pp.

Gaston, A.J.; Nettleship, D.N. 1981. The thick-billed murres of Prince Leopold Island. Can. Wildl. Serv. Monogr. No. 6. 350 pp.

Hall, C.M.; Johnston, M.E. 1995. Polar tourism: tourism in the Arctic and Antarctic regions. Wiley & Sons, New York.

Hatch, S.A.; Nettleship, D.N. 1998. Northern Fulmar (*Fulmarus glacialis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 361. The Birds of North America Inc., Philadelphia.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Schweinsburg, R.E.; Lee, L.J.; Latour, P. 1982. Distribution, movement, and abundance of polar bears in Lancaster Sound, Northwest Territories. Arctic 35:159–169.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

Location: 74°15'N, 80°00'W

Size: Marine 86 ^{2} km terrestrial 0 km

Description: This area includes the waters of eastern Lancaster Sound between approximately 78° W and 82° W. The area often forms as an early, open water feature during spring ice breakup; its shape and size varying according to the extent of the Lancaster Sound ice shelf (Dickins et al. 1990). The eastern Lancaster Sound waters are situated between the Cape Hay (site 12), Hobhouse Inlet (site 9), and Eastern Jones Sound (site 6) key marine habitat sites, as well as several key terrestrial sites (Alexander et al. 1991). The marine area is part of the High Arctic oceanographic zone (Nettleship and Evans 1985).

Ice freeze-up usually occurs by the second week of October, although the ice remains unconsolidated. By November and December, recurring offshore leads form in sea ice off Cape Hay, so that the floe edge is usually not far from shore (Dickins et al. 1990). Depending on wind and ice movement, these leads may join up with those along southern Devon Island and southeastern Bylot Island (Smith and Rigby 1981). Ice breakup typically occurs around 4 June, resulting in 17–18 weeks of open water (Dickins et al. 1990). Mean tides are approximately 1.5 m. Water currents are dominated by the Baffin Bay intrusive current, which usually moves south and west into eastern Lancaster Sound and then east along northern Bylot Island at velocities up to 1 m/s (Dickins et al. 1990).

Biological value: Six major seabird colonies occur around this area: at Baillarge Bay, Prince Leopold Island, Cape Liddon, Hobhouse Inlet, Cape Hay, and Coburg Island. Smaller colonies are also found at Skuas Point, Cape Vera, Baillie-Hamilton Island, and Browne Island. Most birds inhabiting these colonies move through eastern Lancaster Sound during migration or use it as a feeding area (McLaren 1982). At a minimum, 270 000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, 135 000 pairs of Northern Fulmars *Fulmarus glacialis*, and 250 000 pairs of Thick-billed Murres *Uria lomvia* use this area, representing 35%, 57%, and 27% of the Canadian populations of these species, respectively (Nettleship 1980). In addition, several million nonbreeding birds may spend all or part of the summer in this area, and large numbers migrate through to nesting and summering areas in the central Canadian High Arctic and northwest Greenland (McLaren 1982).

Northern Fulmars arrive in late April and by mid-May are concentrated along the Lancaster Sound ice edge or are commonly distributed throughout the offshore area. After June, fulmars are concentrated at the remaining ice edges and in coastal areas, particularly near their colonies; most have left the area by mid-September or early October (McLaren and Renaud 1979). Black-legged Kittiwakes generally arrive in late May or early June and concentrate along ice edge habitats. From mid-June through mid-July, kittiwakes are common and widespread throughout much of the area, but they have left the area by mid- to late October (McLaren and Renaud 1979; McLaren 1982). A major influx of Thick-billed Murres begins about mid-May and continues into June, with the highest number occurring during the third week of May. During June, murres are widespread and common throughout much of eastern Lancaster Sound and western Baffin Bay. During spring and early summer, murre densities are significantly higher along fast ice edges than along ice-free coastlines. Murres leave the area as freeze-up progresses. A few thousand Black Guillemots *Cepphus grylle* winter in open water areas of northwest Baffin Bay (Renaud and Bradstreet 1980). A major movement into the area occurs during late May. During June, guillemots are widespread through the area, along coasts, ice edges, and offshore (McLaren 1982).

Dovekies *Alle alle* migrate through offshore areas of eastern Lancaster Sound and western Baffin Bay to reach colonies in western Greenland (Renaud et al. 1982). From mid- to late May 1976, approximately 1.03 million Dovekies were present in eastern Lancaster Sound (Johnson et al. 1976), and in spring 1979, approximately 2.4 million birds were present (Renaud et al. 1982). Migrating birds are concentrated in offshore areas with moderate to heavy pan ice cover.

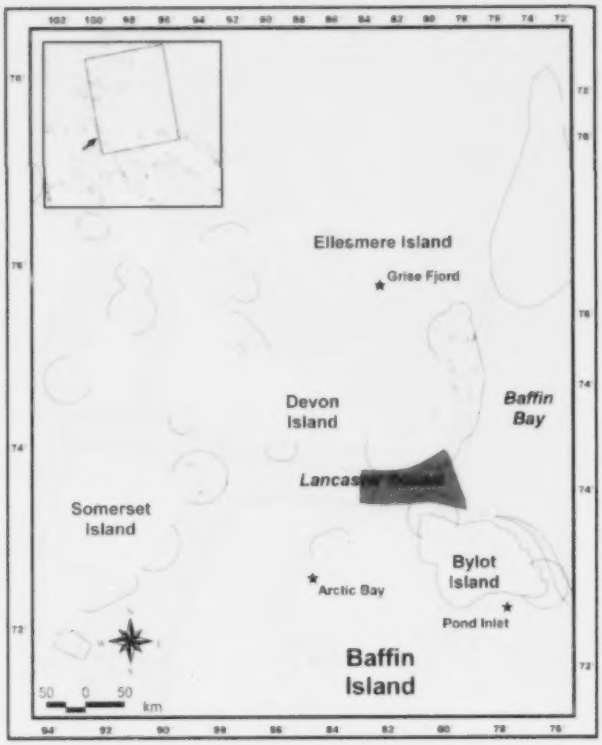
Eastern Lancaster Sound is also important for many marine mammals, especially narwhal *Monodon monoceros*, harp seal *Phoca groenlandica*, and beluga *Delphinapterus leucas* (Dickins et al. 1990), with bowhead whales *Balaena mysticetus* moving through this region during migration (Reeves 1992; Fisheries and Oceans Canada 1990). Polar bears *Ursus maritimus* are numerous in the Lancaster Sound area and use the northern coast of Bylot Island for maternity denning and as a summer retreat (Schweinsburg et al. 1982).

Location: 74°15'N, 80°00'W

Size: Marine – 6172 km^2; terrestrial – 0 km^2

Description: This area includes the waters of eastern Lancaster Sound between approximately 78°W and 82°W. The area often forms as an early, open water feature during spring ice breakup, its shape and size varying according to the extent of the Lancaster Sound ice shelf (Dickins et al. 1990). The eastern Lancaster Sound waters are situated between the Cape Hay (site 12), Hobhouse Inlet (site 9), and Eastern Jones Sound (site 6) key marine habitat sites, as well as several key terrestrial sites (Alexander et al. 1991). The marine area is part of the High Arctic oceanographic zone (Nettleship and Evans 1985).

Ice freeze-up usually occurs by the second week of October, although the ice remains unconsolidated. In November and December, recurring offshore leads form in sea ice off Cape Hay, so that the floe edge is usually not far from shore (Dickins et al. 1990). Depending on wind and ice movement, these leads may join up with those along southern Devon Island and southeastern Bylot Island (Smith and Rigby 1981). Ice breakup typically occurs around 4 June, resulting in 17–18 weeks of open water (Dickins et al. 1990). Mean tides are approximately 1.5 m. Water currents are dominated by the Baffin Bay intrusive current, which usually moves south and west into eastern Lancaster Sound and then east along northern Bylot Island at velocities up to 1 m/s (Dickins et al. 1990).



Biological value: Six major seabird colonies occur around this area, at Baillarge Bay, Prince Leopold Island, Cape Liddon, Hobhouse Inlet, Cape Hay, and Coburg Island. Smaller colonies are also found at Skruis Point, Cape Vera, Baillie-Hamilton Island, and Browne Island. Most birds inhabiting these colonies move through eastern Lancaster Sound during migration or use it as a feeding area (McLaren 1982). At a minimum, 70 000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, 135 000 pairs of Northern Fulmars *Fulmarus glacialis*, and 386 000 pairs of Thick-billed Murres *Uria lomvia* use this area, representing 35%, 57%, and 27% of the Canadian populations of these species, respectively (Nettleship 1980). In addition, several million nonbreeding birds may spend all or part of the summer in this area, and large numbers migrate through to nesting and summering areas in the central Canadian High Arctic and northwest Greenland (McLaren 1982).

Northern Fulmars arrive in late April and by mid-May are concentrated along the Lancaster Sound ice edge or are commonly distributed throughout the offshore area. After June, fulmars are concentrated at the remaining ice edges and in coastal areas, particularly near their colonies; most have left the area by mid-September or early October (McLaren and Renaud 1979). Black-legged Kittiwakes generally arrive in late May or early June and concentrate along ice edge habitats. From mid-June through mid-July, kittiwakes are common and widespread throughout much of the area, but they have left the area by mid- to late October (McLaren and Renaud 1979; McLaren 1982). A major influx of Thick-billed Murres begins about mid-May and continues into June, with the highest number occurring during the third week of May. During June, murres are widespread and common throughout much of eastern Lancaster Sound and western Baffin Bay. During spring and early summer, murre densities are significantly higher along fast ice edges than along ice-free coastlines. Murres leave the area as freeze-up progresses. A few thousand Black Guillemots *Cepphus grylle* winter in open water areas of northwest Baffin Bay (Renaud and Bradstreet 1980). A major movement into the area occurs during late May. During June, guillemots are widespread through the area, along coasts, ice edges, and offshore (McLaren 1982).

Dovekies *Alle alle* migrate through offshore areas of eastern Lancaster Sound and western Baffin Bay to reach colonies in western Greenland (Renaud et al. 1982). From mid- to late May 1976, approximately 1.63 million Dovekies were present in eastern Lancaster Sound (Johnson et al. 1976), and in spring 1979, approximately 2.4 million birds were present (Renaud et al. 1982). Migrating birds are concentrated in offshore areas with moderate to heavy pan ice cover.

Eastern Lancaster Sound is also important for many marine mammals, especially narwhal *Monodon monoceros*, harp seal *Phoca groenlandica*, and beluga *Delphinapterus leucas* (Dickins et al. 1990), with bowhead whales *Balaena mysticetus* moving through this region during migration (Riewe 1992; Fisheries and Oceans Canada 1999). Polar bears *Ursus maritimus* are numerous in the Lancaster Sound area and use the northern coast of Bylot Island for maternity denning and as a summer retreat (Schweinsburg et al. 1982).

Sensitivities: Nesting seabirds are sensitive to disturbance and the pollution of their feeding areas.

Potential conflicts: Lancaster Sound, western Baffin Bay, and Davis Strait have potential to become marine shipping routes and areas of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979; DIAND 1982). There is also increasing activity by cruise ships or outfitters in boats from Pond Inlet and elsewhere in the eastern Arctic (Marshall Macklin Monaghan Ltd. 1982; Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Eastern Lancaster Sound is an Important Bird Area in Canada (NU058; CEC 1999).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

DIAND. 1982. The Lancaster Sound region: 1980–2000. Green Paper, Department of Indian Affairs and Northern Development, Ottawa. 102 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Fisheries and Oceans Canada. 1999. Marine environmental handbook — Arctic and Northwest Passage. Fisheries and Oceans Canada, Ottawa. 136 pp.

Imperial Oil Ltd. 1978. Environmental impact statement for exploratory drilling in Davis Strait region. Unpublished report, Imperial Oil Ltd., Aquitaine Co. Canada Ltd., and Canada Cities Services Ltd. 31 pp.

Johnson, S.R.; Renaud, W.E.; Richardson, W.J.; Davis, R.A.; Holdsworth, C.; Hollingdale, P.D. 1976. Aerial surveys of birds in eastern Lancaster Sound, 1976. Unpublished report, LGL Ltd. environmental research associates for Norlands Petroleum, Calgary. 365 pp.

Marshall Macklin Monaghan Ltd. 1982. Community tourism development plan — Pond Inlet. Unpublished report for Government of the Northwest Territories Economic Development and Tourism, Yellowknife. 79 pp.

McLaren, P.L. 1982. Spring migration and habitat use by seabirds in eastern Lancaster Sound and western Baffin Bay. Arctic 35:88–111.

McLaren, P.L.; McLaren, M.A. 1982. Waterfowl populations in eastern Lancaster Sound and western Baffin Bay. Arctic 35:149–157.

McLaren, P.L.; Renaud, W.E. 1979. Distribution of sea-associated birds in northwest Baffin Bay and adjacent waters, May–October 1978. Vols. 1 and 2. Unpublished report, LGL Ltd. environmental research associates for Petro-Canada, Calgary. 312 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Petro-Canada Ltd. 1979. Initial environmental assessment. Proposed Baffin Bay exploratory drilling program. Unpublished report, Petro-Canada Ltd., Calgary. 414 pp.

Renaud, W.E.; Bradstreet, M.S.W. 1980. Late winter distribution of Black Guillemots in northern Baffin Bay and the Canadian High Arctic. Can. Field-Nat. 94:421–425

Renaud, W.E.; McLaren, P.L.; Johnson, S.R. 1982. The dovekie, *Alle alle*, as a spring migrant in eastern Lancaster Sound and western Baffin Bay. Arctic 35:118–125.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Schweinsburg, R.E.; Lee, L.J.; Latour, P. 1982. Distribution, movement, and abundance of polar bears in Lancaster Sound, Northwest Territories. Arctic 35:159–169.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

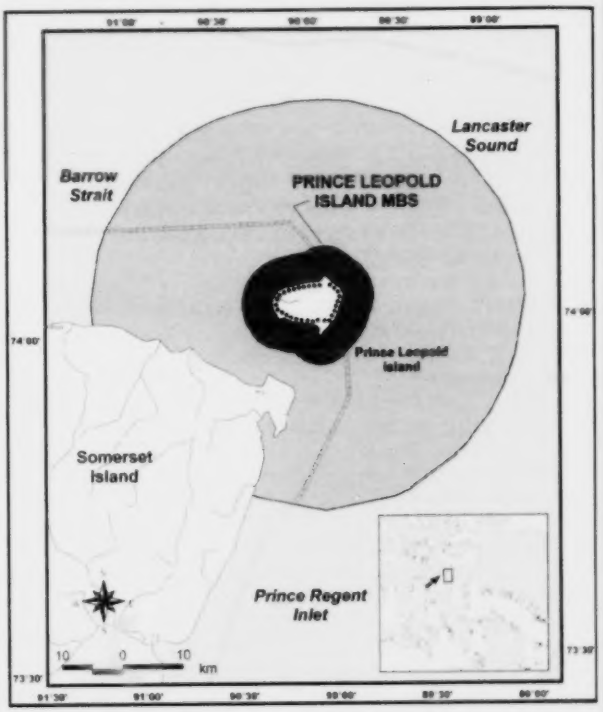
Location: 74°02'N, 90°00'W

Size: Marine – 3140 km^2; terrestrial – 66 km^2

Description: Prince Leopold Island is situated in western Lancaster Sound at the junction of Prince Regent Inlet and Barrow Strait, approximately 13 km north of Cape Clarence, Somerset Island. The terrestrial characteristics of the island are described in Alexander et al. (1991).

The island and Cape are in the western part of Lancaster Sound (Dickins et al. 1990) and in the High Arctic oceanographic zone (Nettleship and Evans 1985). Mean tides are approximately 1.6 m, with 11–12 weeks of open water to the east of the island and 7–9 weeks to the west. Lancaster Sound is usually ice-covered by late October. In normal years, leads open in the ice of Lancaster Sound beginning in April. As breakup continues, an eastward edge of fast ice often extends from Prince Leopold Island to Maxwell Bay on Devon Island (Smith and Rigby 1981); this is the most common ice edge position in Lancaster Sound (Dickins et al. 1990). Normal ice breakup around Prince Leopold Island occurs between 25 June and 16 July (Dickins et al. 1990).

Strong water currents flow west from Barrow Strait along the southern coast of Devon Island, with a substantial water transfer south into Prince Regent Inlet. The major current interactions around Prince Leopold Island (65–100 cm/s; Dickins et al. 1990) are thought to create local enrichment of nutrients and enhance phytoplankton growth, with consequent effects up the food chain, resulting in highly suitable conditions for seabirds (Gaston and Nettleship 1981).



Biological value: The waters around Prince Leopold Island are critical for a variety of Arctic seabirds, including Thick-billed Murres *Uria lomvia* (86 000 pairs, Gaston and Hipfner 2000), Black-legged Kittiwakes *Rissa tridactyla* (29 000 pairs), Northern Fulmars *Fulmarus glacialis* (62 000 pairs, Hatch and Nettleship 1998), and Black Guillemots *Cepphus grylle* (4000 pairs). These numbers represent 6%, 16%, 26%, and 5% of the national populations of these species, respectively. The island also supports 200 pairs of Glaucous Gulls *Larus hyperboreus*. The island is considered a key terrestrial site for migratory birds (Alexander et al. 1991). Cape Clarence also supports another 20 pairs of Glaucous Gulls and 200 pairs of Black Guillemots (Nettleship 1980).

This marine region is occupied by seabirds generally from early May to the end of September. Significant concentrations of marine birds may be distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (Gaston and Nettleship 1981; Riewe 1992). Seabird nesting occurs almost everywhere around the island. Murres from the colonies on Prince Leopold Island forage as far away as the Brodeur Peninsula and across to Blanley, Maxwell, and Radstock bays on Devon Island and west between Cunningham Inlet and Cape Admiral McClintock on Somerset Island (Gaston and Nettleship 1981). The ice edge at the mouth of Wellington Channel is also an important foraging area (Bradstreet 1979, 1980). Many birds also forage close to the colony, particularly during ice breakup (Bradstreet 1979; Gaston and Nettleship 1981). Interface habitats (along shorelines or ice edges) are key foraging locations for Arctic cod *Boreogadus saida* and various epontic invertebrates (Bradstreet 1979, 1980). Resting areas and colony departure sites for chicks and attending males are located near Prince Leopold Island (Gaston and Nettleship 1981).

In addition to various seabirds, the waters around Prince Leopold Island are also important for marine mammals, including beluga *Delphinapterus leucas*, bowhead whale *Balaena mysticetus*, narwhal *Monodon monoceros*, walrus *Odobenus rosmarus*, polar bear *Ursus maritimus*, ringed seal *Phoca hispida*, and bearded seal *Erignathus barbatus* (Dickins et al. 1990; Riewe 1992; Fisheries and Oceans Canada 1999). The area is used by hunters from Resolute Bay (Fisheries and Oceans Canada 1999).

Sensitivities: The waters to the east of Prince Leopold Island are considered to be "highly sensitive" to oil spills, whereas those to the west of the island are of "moderate sensitivity" with regard to oil spills (Dickins et al. 1990). Seabirds are sensitive to disturbance at their colonies and to the pollution of offshore waters.

Potential conflicts: Lancaster Sound, Barrow Strait, and Prince Regent Inlet have potential to become marine shipping routes and areas of hydrocarbon exploration and development (DIAND 1982) and are of increasing importance as tourist destinations for cruise ships and small aircraft (Hall and Johnston 1995; Wakelyn 2001). Changes in ship traffic may affect ice breakup patterns (Fisheries and Oceans Canada 1999). Prince Leopold Island is one of the most disturbed seabird colonies in Arctic Canada (Chardine and Mendenhall 1998). Oil spills associated with drilling or

shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Prince Leopold Island was designated as a Migratory Bird Sanctuary in 1995, including waters 5 km offshore from the high tide line. It was identified in the International Biological Programme (Region 9, Site No. 1-5; Nettleship 1980), it is an Important Bird Area in Canada (NU006; CEC 1999), and it is a UNESCO World Heritage Site.

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Bradstreet, M.S.W. 1979. Thick-billed murres and black guillemots in the Barrow Strait area, N.W.T., during spring: distribution and habitat use. Can. J. Zool. 57:1789–1802.

Bradstreet, M.S.W. 1980. Thick-billed murres and black guillemots in the Barrow Strait area, N.W.T., during spring: diets and food availability along ice edges. Can. J. Zool. 58:2120–2140.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Chardine, J.; Mendenhall, V. 1998. Human disturbance at arctic seabird colonies. Circumpolar Seabird Working Group Technical Report No. 2, Conservation of Arctic Flora and Fauna, Akureyri, Iceland.

DIAND. 1982. The Lancaster Sound Region: 1980–2000. Green Paper, Department of Indian Affairs and Northern Development, Ottawa. 102 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Fisheries and Oceans Canada. 1999. Marine environmental handbook — Arctic and Northwest Passage. Fisheries and Oceans Canada, Ottawa. 136 pp.

Gaston, A.J.; Hipfner, J.M. 2000. Thick-billed Murre (*Uria lomvia*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 497. The Birds of North America Inc., Philadelphia.

Gaston, A.J.; Nettleship, D.N. 1981. The thick-billed murres of Prince Leopold Island. Can. Wildl. Serv. Monogr. No. 6. 350 pp.

Hall, C.M.; Johnston, M.E. 1995. Polar tourism: tourism in the Arctic and Antarctic regions. Wiley & Sons, New York.

Hatch, S.A.; Nettleship, D.N. 1998. Northern Fulmar (*Fulmarus glacialis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 361. The Birds of North America Inc., Philadelphia.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

Lancaster Sound
Cape Hay
BYLOT
ISLAND MBS
Bylot
Island

12 – Cape Hay

Location: 73°45'N, 80°22'W

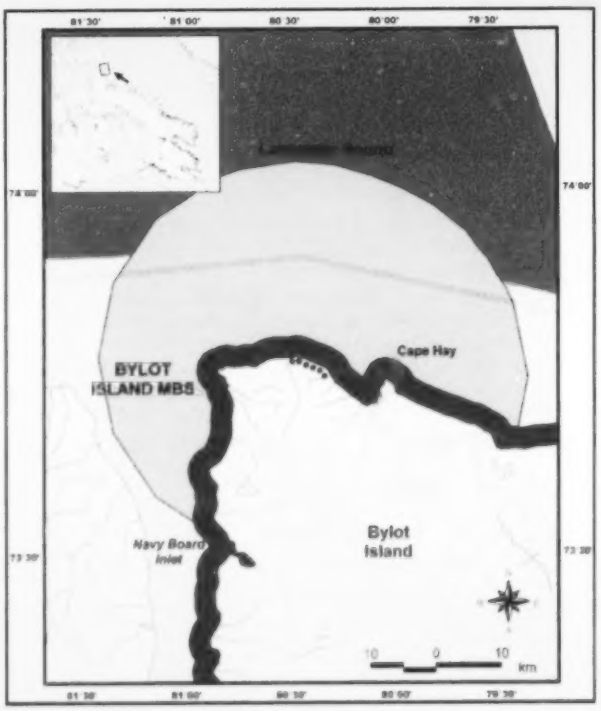
Size: Marine – 2070 km^2; terrestrial – 1 km^2

Description: Cape Hay is located near the northwestern tip of Bylot Island, which lies northeast of Baffin Island at the eastern entrance to Lancaster Sound. The Cape is approximately 140 km northwest of the community of Pond Inlet (Mittimatalik). The marine area is part of the High Arctic oceanographic zone (Nettleship and Evans 1985). The terrestrial characteristics of Cape Hay are described in Alexander et al. (1991).

Ice freeze-up usually occurs by the second week of October, although the ice remains unconsolidated. In November and December, recurring offshore leads form in sea ice off Cape Hay, meaning the floe edge is usually not far from shore (Dickins et al. 1990). Depending on wind and ice movement, these leads may join up with those along southern Devon Island and southeastern Bylot Island (Smith and Rigby 1981). Ice breakup typically occurs around 4 June, resulting in 17–18 weeks of open water off the Cape (Dickins et al. 1990). Mean tides are approximately 1.5 m. Water currents are dominated by the Baffin Bay intrusive current, which usually moves east along northern Bylot Island at velocities up to 1 m/s (Dickins et al. 1990).

Biological value: Approximately 140 000 pairs of Thick-billed Murres *Uria lomvia* (Gaston and Hipfner 2000) and 20 000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, each representing more than 10% of the Canadian population, nest at Cape Hay. Cape Hay is one of the five largest Thick-billed Murre colonies in Canada (Gaston and Hipfner 2000). Johnson et al. (1976) found that most murres from Cape Hay foraged within 30 km of the colony, although some were up to 60 km away. The ice edge around the Cape is also a critical staging and feeding area for murres and kittiwakes migrating to colonies farther west in Lancaster Sound (McLaren 1982). Although they do not nest at Cape Hay, thousands of Northern Fulmars *Fulmarus glacialis* use ice edges around Cape Hay for feeding during migration (McLaren 1982). Hundreds of Black Guillemots *Cepphus grylle* also feed and stage off Cape Hay in May and June (McLaren 1982). Thousands of Dovekies *Alle alle* may be found in the marine area around the Cape during May migration to their breeding sites on the west coast of Greenland (Renaud et al. 1982). This marine region is occupied by seabirds from mid-April through October. Significant concentrations of marine birds may be distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (McLaren 1982; Dickins et al. 1990; Riewe 1992).

The marine area around Cape Hay is also important for many marine mammals, especially narwhal *Monodon monoceros*, harp seal *Phoca groenlandica*, and beluga *Delphinapterus leucas* (Dickins et al. 1990). Bowhead whales *Balaena mysticetus* move past the Cape during migration (Riewe 1992; Fisheries and Oceans Canada 1999). Polar bears *Ursus maritimus* are numerous in the Lancaster Sound area and use the northern coast of Bylot Island for maternity denning and as a summer retreat (Schweinsburg et al. 1982).



Inuit from Pond Inlet hunt marine mammals along the northern shore of Bylot Island near the Cape (Fisheries and Oceans Canada 1999).

Sensitivities: Nesting seabirds are sensitive to disturbance and the pollution of their feeding areas. The shoreline area around the Cape is listed as being of "high sensitivity" from May to October for impact of oil spills. The offshore area is listed as being of "moderate sensitivity" from September through April, but of "high sensitivity" from May through August (Dickins et al. 1990).

Potential conflicts: Lancaster Sound, western Baffin Bay, and Davis Strait have potential to become marine shipping routes and areas of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979; DIAND 1982). There is also increasing activity with cruise ships or outfitters in boats in the eastern Arctic (Marshall Macklin Monaghan Ltd. 1982; Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Cape Hay is an International Biological Programme site (Region 9, Site No. 7-5; Nettleship 1980) and a Canadian Important Bird Area (NU004; CEC 1999). The Cape is part of Bylot Island Migratory Bird Sanctuary, established in 1965, and part of Sirmilik National Park, established in 2001.

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Bradstreet, M.S.W. 1982. Occurrence, habitat use, and behavior of seabirds, marine mammals, and arctic cod at the Pond Inlet ice edge. Arctic 35:28–40.

Brown, R.G.B.; Nettleship, D.N. 1981. The biological significance of polynyas to arctic colonial seabirds. Pages 56–66 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

DIAND. 1982. The Lancaster Sound region: 1980–2000. Green Paper, Department of Indian Affairs and Northern Development, Ottawa. 102 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Fisheries and Oceans Canada. 1999. Marine environmental handbook — Arctic and Northwest Passage. Fisheries and Oceans Canada, Ottawa. 136 pp.

Imperial Oil Ltd. 1978. Environmental impact statement for exploratory drilling in Davis Strait region. Unpublished report, Imperial Oil Ltd., Aquitaine Co. Canada Ltd., and Canada Cities Services Ltd. 31 pp.

Johnson, S.R.; Renaud, W.E.; Richardson, W.J.; Davis, R.A.; Holdsworth, C.; Hollingdale, P.D. 1976. Aerial surveys of birds in eastern Lancaster Sound, 1976. LGL Ltd. environmental research associates for Norlands Petroleum, Calgary. 365 pp.

Marshall Macklin Monaghan Ltd. 1982. Community tourism development plan — Pond Inlet. Unpublished report for Government of the Northwest Territories Economic Development and Tourism, Yellowknife. 79 pp.

McLaren, P.L. 1982. Spring migration and habitat use by seabirds in eastern Lancaster Sound and western Baffin Bay. Arctic 35:88–111.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Petro-Canada Ltd. 1979. Initial environmental assessment. Proposed Baffin Bay exploratory drilling program. Unpublished report, Petro-Canada Ltd., Calgary. 414 pp.

Renaud, W.E.; McLaren, P.L.; Johnson, S.R. 1982. The dovekie, *Alle alle*, as a spring migrant in eastern Lancaster Sound and western Baffin Bay. Arctic 35:118–125.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Schweinsburg, R.E.; Lee, L.J.; Latour, P. 1982. Distribution, movement, and abundance of polar bears in Lancaster Sound, Northwest Territories. Arctic 35:159–169.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

13 – Baillarge Bay

Location: 73°25'N, 84°30'W

Size: Marine – 764 km^2; terrestrial – 0 km^2

Description: Baillarge Bay is situated at the northeastern tip of Admiralty Inlet on northern Baffin Island, approximately 40 km north of the community of Arctic Bay. This marine area is in the High Arctic oceanographic zone (Nettleship and Evans 1985). The terrestrial characteristics of the island are described in Alexander et al. (1991).

Mean tides at Baillarge Bay are approximately 1.7 m, with 9 weeks of open water. However, within 50 km, the water stays open for 13–15 weeks in Lancaster Sound. Fast ice forms in Admiralty Inlet. Nearby Lancaster Sound is usually ice-covered by mid-October, and normal ice breakup around Baillarge Bay occurs in late July (Dickins et al. 1990). Water flows north out of Admiralty Inlet and into Lancaster Sound, with strong reversing tidal currents at the mouth of the inlet. The major current interactions north of Prince Regent Inlet are thought to create local enrichment of nutrients and subsequent enhanced phytoplankton growth, with consequent effects up the food chain, resulting in highly suitable conditions for seabirds (Gaston and Nettleship 1981).

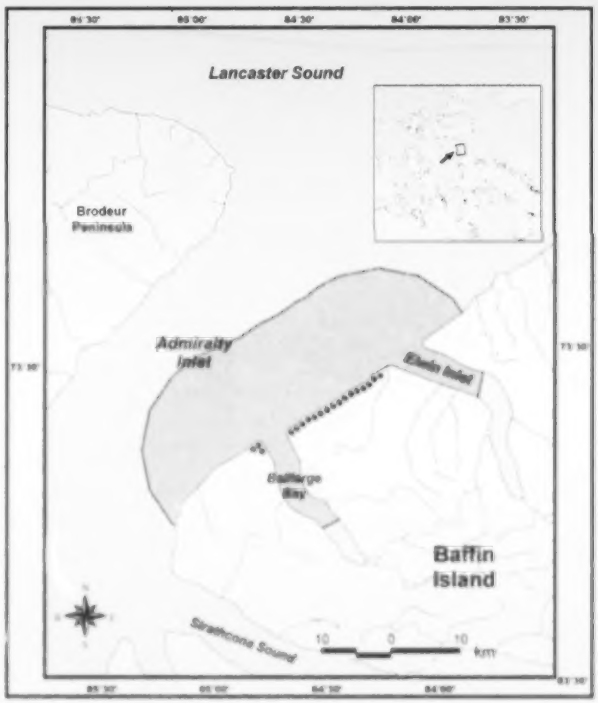
Biological value: A major Northern Fulmar *Fulmarus glacialis* colony, estimated at 30 000 pairs, breeds along 16 km of coast between Baillarge Bay and Elwin Inlet (Hatch and Nettleship 1998). This colony represents about 13% of the Canadian population of this species (Hatch and Nettleship 1998). However, the estimate is provisional and could be between 10 000 and 100 000 pairs (Nettleship 1980). There are also about 50 pairs of Glaucous Gulls *Larus hyperboreus* breeding at Baillarge Bay (T. Gaston, unpubl. data).

Fulmars use Baillarge Bay between April and early October. Fulmars and Black Guillemots *Cepphus grylle* congregate at the floe edge along Admiralty Inlet and may congregate off the colony when fast ice disperses. Significant concentrations of marine birds may be distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (Gaston and Nettleship 1981; Dickins et al. 1990; Riewe 1992). Traditional Inuit knowledge indicates that many seabirds feed in Admiralty Inlet off Baillarge Bay (Riewe 1992).

The waters around Baillarge Bay are important for marine mammals, notably narwhal *Monodon monoceros* (Sergeant and Hay 1979), ringed seal *Phoca hispida*, harp seal *Phoca groenlandica*, and beluga *Delphinapterus leucas* (Dickins et al. 1990). Polar bears *Ursus maritimus* use the area as a summer retreat, concentrating in deep bays where the ice persists (Stirling et al. 1979).

Sensitivities: The waters around Baillarge Bay are considered to be of "moderate" offshore sensitivity to damage from oil spills through most of the year (Dickins et al. 1990). Seabirds are sensitive to disturbance at their colonies and to the pollution of offshore waters.

Potential conflicts: Lancaster Sound, Barrow Strait, and Prince Regent Inlet have potential to become marine shipping routes and areas of hydrocarbon exploration and development (DIAND 1982). This area is also of increasing importance as a tourist destination for cruise ships (Hall and Johnston 1995; Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas. The lead/zinc mine at Nanisivik (40 km away) closed in 2003, so any further threats from mine tailings were reduced at that time.



Status: Baillarge Bay is both an International Biological Programme site (Region 9, Site No. 7-7; Nettleship 1980) and an Important Bird Area site in Canada (NU067; CEC 1999). The terrestrial portion of the majority of the colony (between Baillarge Bay and Elwin Inlet) is part of Sirmilik National Park, established in 2001.

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

DIAND. 1982. The Lancaster Sound Region: 1980–2000. Green Paper, Department of Indian Affairs and Northern Development, Ottawa. 102 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Gaston, A.J.; Nettleship, D.N. 1981. The thick-billed murres of Prince Leopold Island. Can. Wildl. Serv. Monogr. No. 6. 350 pp.

Hall, C.M.; Johnston, M.E. 1995. Polar tourism: tourism in the Arctic and Antarctic regions. Wiley & Sons, New York.

Hatch, S.A.; Nettleship, D.N. 1998. Northern Fulmar (*Fulmarus glacialis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 361. The Birds of North America Inc., Philadelphia.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Sergeant, D.E.; Hay, K. 1979. Migratory sea mammal populations in Lancaster Sound. ESCOM Rep. No. A1-21, Department of Indian and Northern Affairs, Ottawa. 31 pp.

Stirling, I.; Schweinsburg, R.E.; Calvert, W.; Killian, H.P.L. 1979. Population ecology of the polar bear along the proposed Arctic Islands Gas Pipeline Route. ESCOM Report No. A1-24, Department of Indian and Northern Affairs, Ottawa. 93 pp.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

Location: 73°14'N, 91°25'W

Size: Marine – 1549 km^2; terrestrial – 0 km^2

Description: Batty Bay is a 10-km-long inlet on the eastern side of Somerset Island, which drains into Prince Regent Inlet. It is 5 km wide at its mouth, with tidal flats on the north and south coasts. This key terrestrial habitat site is described in Alexander et al. (1991).

Batty Bay is located in the High Arctic oceanographic zone (Nettleship and Evans 1985). Breakup of consolidated ice in Prince Regent Inlet usually begins in late June, but <90% ice cover usually does not occur until the first week of August (Dickins et al. 1990). However, a major recurrent flaw lead occurs along the western side of Prince Regent Inlet as early as January and persists into May (Smith and Rigby 1981). The marine area around Batty Bay experiences 9–10 weeks of open water, with freeze-up usually occurring during the first week of October (Smith and Rigby 1981). Main water currents move south along the eastern coast of Somerset Island, and tides are usually in the range of 1.6 m.

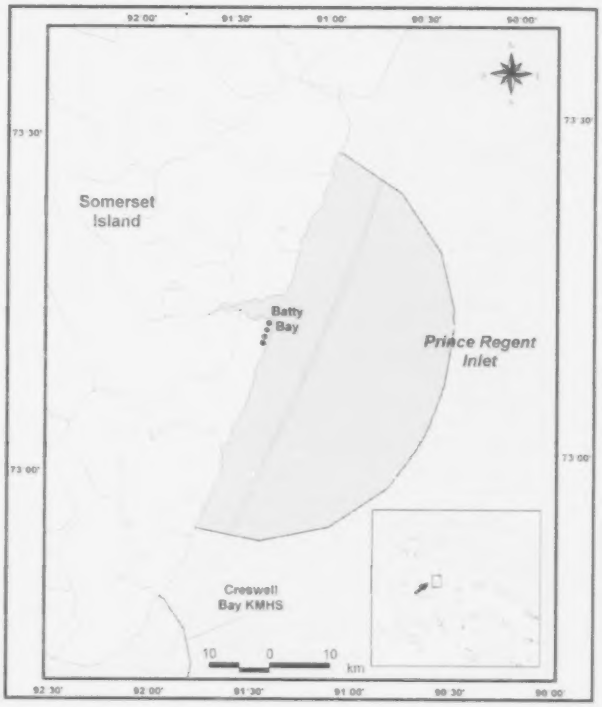
Biological value: In 1975, 2000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, or about 1% of the Canadian population, nested at Batty Bay. However, in 1974, only 350 pairs were present. Attendance at the colony is probably influenced by ice conditions in Prince Regent Inlet (Alliston et al. 1976). The size and consistency of use for this colony need to be reassessed to determine if the colony usually supports 1% of the Canadian population of kittiwakes. Migrating King Eiders *Somateria spectabilis* and Common Eiders *S. mollissima borealis* may stage along the east coast of Somerset Island in significant numbers (McLaren and Alliston 1976).

This marine region is an important migratory corridor for beluga *Delphinapterus leucas* and is also used by walrus *Odobenus rosmarus* and polar bear *Ursus maritimus* (Sergeant and Hay 1979; Riewe 1992).

Sensitivities: Seabirds are sensitive to disturbance at their colonies and to the pollution of offshore waters.

Potential conflicts: Lancaster Sound, Barrow Strait, and Prince Regent Inlet have potential to become marine shipping routes and areas of hydrocarbon exploration and development (DIAND 1982). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Batty Bay is a key terrestrial habitat site (Alexander et al. 1991).



References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Alliston, W.G.; Bradstreet, M.S.W.; McLaren, M.A.; Davis, R.A.; Richardson, W.J. 1976. Numbers and distribution of birds in the central District of Franklin, NWT: June–August, 1975. Vols. 1 and 2. Unpublished report, LGL Ltd. environmental research associates for Polar Gas Project, Toronto. 587 pp.

DIAND. 1982. The Lancaster Sound Region: 1980–2000. Green Paper, Department of Indian Affairs and Northern Development, Ottawa. 102 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

McLaren, M.A.; Alliston, W.G. 1985. Effects of snow and ice on waterfowl distribution in the central Arctic islands. Arctic 38:43–52.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.). The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Sergeant, D.E.; Hay, K. 1979. Migratory sea mammal populations in Lancaster Sound. ESCOM Rep. No. A1-21, Department of Indian and Northern Affairs, Ottawa. 31 pp.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.). Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

15 – Cape Graham Moore

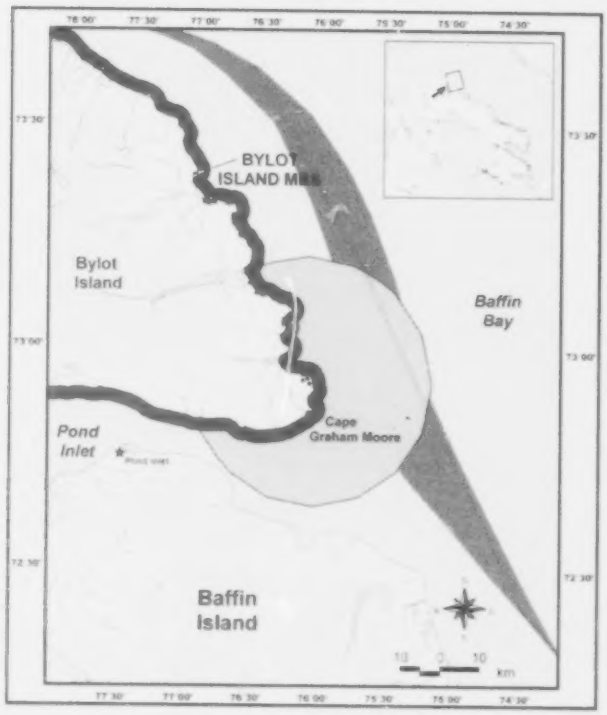
Location: 72°55'N, 76°05'W

Size: Marine – 2104 km^2; terrestrial – 0 km^2

Description: Cape Graham Moore is situated on the southeastern tip of Bylot Island, which lies northeast of Baffin Island at the eastern entrance to Lancaster Sound, but pointing out into Baffin Bay. The Cape is approximately 70 km northeast of the community of Pond Inlet (Mittimatalik) and lies in the High Arctic oceanographic zone (Nettleship and Evans 1985). The terrestrial characteristics of Cape Graham Moore are described in Alexander et al. (1991).

Over winter, open water develops parallel to the eastern and southeastern coast of Bylot Island, eventually joining up with the Lancaster Sound Polynya and North Water Polynya (Smith and Rigby 1981). Recurring offshore leads form in sea ice off Cape Graham Moore, with a relatively narrow landfast ice band (although this may vary greatly between years; McLaren 1982), so that the floe edge is usually not far from shore (Dickins et al. 1990). However, landfast ice forms in Pond Inlet and Eclipse Sound, with an edge near Cape Graham Moore. Melt, breakup, and movement of ice mean that >90% total ice cover remains until mid-July near the Cape, resulting in 11–12 weeks of open water (Dickins et al. 1990). Ice freeze-up usually occurs by the third week of October. Mean tides are approximately 1.5 m. Water currents are dominated by the Baffin Bay intrusive current, which usually moves east along northern Bylot Island. Off the eastern shore of Bylot Island, large eddies occur frequently as waters from Lancaster Sound, the Baffin Bay intrusive current, and other currents in Baffin Bay meet.

Biological value: Approximately 30 000 pairs of Thick-billed Murres *Uria lomvia* (Gaston and Hipfner 2000) and 3000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, each representing more than 1% of the Canadian population, nest about 7 km north of Cape Graham Moore. More recent surveys are needed to update these data. In May and June, fulmars, kittiwakes, murres, and guillemots are also numerous at the ice edge off Cape Graham Moore (Bradstreet 1982; McLaren 1982), perhaps because this is the nearest open water to the colonies around the Cape, as well as colony sites to the south at Scott Inlet and Buchan Gulf (Brown and Nettleship 1981). Thousands of Dovekies *Alle alle* may be found in the marine area around the Cape during May migration to their breeding sites on the west coast of Greenland (Renaud et al. 1982). The Ivory Gull *Pagophila eburnea*, an endangered species, also migrates and stages along this ice edge (Bradstreet 1982). In October 1979, 375 Ivory Gulls were seen at the Pond Inlet settlement (Renaud and McLaren 1982). The birds apparently move to offshore areas in early October as freeze-up occurs. Up to 18 species of birds have been observed in May and June at the ice edge near this site (Bradstreet 1982). This marine region is occupied by seabirds from mid-April through October (Riewe 1992). Significant concentrations of marine birds may be distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (McLaren 1982; Riewe 1992).



The marine area around Cape Graham Moore is also important for many marine mammals, especially narwhal *Monodon monoceros*, ringed seal *Phoca hispida*, harp seal *Phoca groenlandica*, beluga *Delphinapterus leucas*, and polar bear *Ursus maritimus* (Bradstreet 1982). Bowhead whales *Balaena mysticetus* move past this cape during migration (Riewe 1992; Fisheries and Oceans Canada 1999).

A traditional, seasonal hunting camp is located at Button Point, a few kilometres southwest of Cape Graham Moore (Riewe 1992). From this site, Inuit hunt bears and seals at the nearby floe edge (Fisheries and Oceans Canada 1999) and also collect murre eggs.

Sensitivities: Nesting seabirds are sensitive to disturbance and the pollution of their feeding areas. The shoreline area around the Cape is listed as being of "extreme sensitivity" from May to October for impact of oil spills. The offshore area is listed as being of "moderate sensitivity" from September through April, but of "high sensitivity" from May through August (Dickins et al. 1990).

Potential conflicts: Lancaster Sound, western Baffin Bay, and Davis Strait have potential to become marine shipping routes and areas of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979; DIAND 1982). There is also increasing activity by cruise ships and local outfitters in the eastern Arctic (Marshall Macklin Monaghan Ltd. 1982; Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Cape Graham Moore is an International Biological Programme site (Region 9, Site No. 7-5; Nettleship 1980)

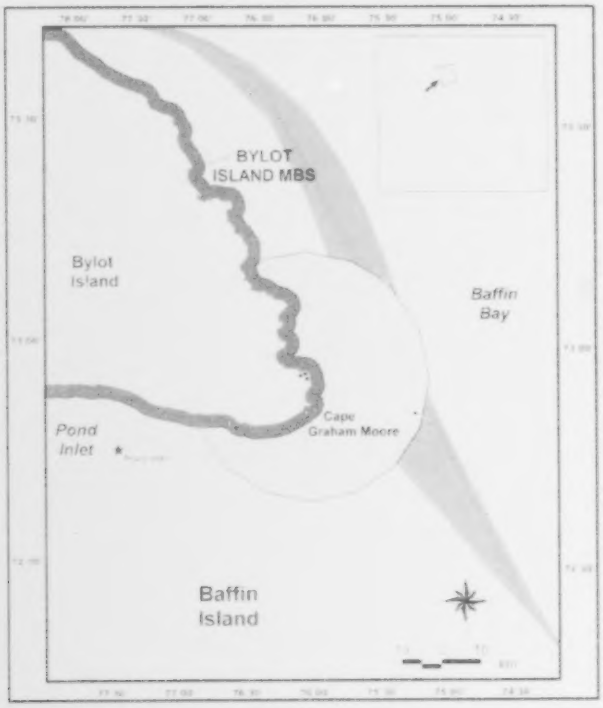
Location: 72°55'N, 76°05'W

Size: Marine – 2104 km²; terrestrial – 0 km²

Description: Cape Graham Moore is situated on the southeastern tip of Bylot Island, which lies northeast of Baffin Island at the eastern entrance to Lancaster Sound, but pointing out into Baffin Bay. The Cape is approximately 70 km northeast of the community of Pond Inlet (Mittimatalik) and lies in the High Arctic oceanographic zone (Nettleship and Evans 1985). The terrestrial characteristics of Cape Graham Moore are described in Alexander et al. (1991).

Over winter, open water develops parallel to the eastern and southeastern coast of Bylot Island, eventually joining up with the Lancaster Sound Polynya and North Water Polynya (Smith and Rigby 1981). Recurring offshore leads form in sea ice off Cape Graham Moore, with a relatively narrow landfast ice band (although this may vary greatly between years; McLaren 1982), so that the floe edge is usually not far from shore (Dickins et al. 1990). However, landfast ice forms in Pond Inlet and Eclipse Sound, with an edge near Cape Graham Moore. Melt, breakup, and movement of ice mean that >90% total ice cover remains until mid-July near the Cape, resulting in 11–12 weeks of open water (Dickins et al. 1990). Ice freeze-up usually occurs by the third week of October. Mean tides are approximately 1.5 m. Water currents are dominated by the Baffin Bay intrusive current, which usually moves east along northern Bylot Island. Off the eastern shore of Bylot Island, large eddies occur frequently as waters from Lancaster Sound, the Baffin Bay intrusive current, and other currents in Baffin Bay meet.

Biological value: Approximately 30 000 pairs of Thick-billed Murres *Uria lomvia* (Gaston and Hipfner 2000) and 3000 pairs of Black-legged Kittiwakes *Rissa tridactyla*, each representing more than 1% of the Canadian population, nest about 7 km north of Cape Graham Moore. More recent surveys are needed to update these data. In May and June, fulmars, kittiwakes, murres, and guillemots are also numerous at the ice edge off Cape Graham Moore (Bradstreet 1982; McLaren 1982), perhaps because this is the nearest open water to the colonies around the Cape, as well as colony sites to the south at Scott Inlet and Buchan Gulf (Brown and Nettleship 1981). Thousands of Dovekies *Alle alle* may be found in the marine area around the Cape during May migration to their breeding sites on the west coast of Greenland (Renaud et al. 1982). The Ivory Gull *Pagophila eburnea*, an endangered species, also migrates and stages along this ice edge (Bradstreet 1982). In October 1979, 375 Ivory Gulls were seen at the Pond Inlet settlement (Renaud and McLaren 1982). The birds apparently move to offshore areas in early October as freeze-up occurs. Up to 18 species of birds have been observed in May and June at the ice edge near this site (Bradstreet 1982). This marine region is occupied by seabirds from mid-April through October (Riewe 1992). Significant concentrations of marine birds may be distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (McLaren 1982; Riewe 1992).



The marine area around Cape Graham Moore is also important for many marine mammals, especially narwhal *Monodon monoceros*, ringed seal *Phoca hispida*, harp seal *Phoca groenlandica*, beluga *Delphinapterus leucas*, and polar bear *Ursus maritimus* (Bradstreet 1982). Bowhead whales *Balaena mysticetus* move past this cape during migration (Riewe 1992; Fisheries and Oceans Canada 1999).

A traditional, seasonal hunting camp is located at Button Point, a few kilometres southwest of Cape Graham Moore (Riewe 1992). From this site, Inuit hunt bears and seals at the nearby floe edge (Fisheries and Oceans Canada 1999) and also collect murre eggs.

Sensitivities: Nesting seabirds are sensitive to disturbance and the pollution of their feeding areas. The shoreline area around the Cape is listed as being of "extreme sensitivity" from May to October for impact of oil spills. The offshore area is listed as being of "moderate sensitivity" from September through April, but of "high sensitivity" from May through August (Dickins et al. 1990).

Potential conflicts: Lancaster Sound, western Baffin Bay, and Davis Strait have potential to become marine shipping routes and areas of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979; DIAND 1982). There is also increasing activity by cruise ships and local outfitters in the eastern Arctic (Marshall Macklin Monaghan Ltd. 1982; Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Cape Graham Moore is an International Biological Programme site (Region 9, Site No. 7-5; Nettleship 1980).

and a Canadian Important Bird Area (NU068; CEC 1999). The Cape is part of Bylot Island Migratory Bird Sanctuary, established in 1965, and is located just south of the boundary of Sirmilik National Park, established in 2001.

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Bradstreet, M.S.W. 1982. Occurrence, habitat use, and behavior of seabirds, marine mammals, and arctic cod at the Pond Inlet ice edge. Arctic 35:28–40.

Brown, R.G.B.; Nettleship, D.N. 1981. The biological significance of polynyas to arctic colonial seabirds. Pages 56–66 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

DIAND. 1982. The Lancaster Sound region: 1980–2000. Green Paper, Department of Indian Affairs and Northern Development, Ottawa. 102 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Fisheries and Oceans Canada. 1999. Marine environmental handbook — Arctic and Northwest Passage. Fisheries and Oceans Canada, Ottawa. 136 pp.

Gaston, A.J.; Hipfner, J.M. 2000. Thick-billed Murre (*Uria lomvia*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 497. The Birds of North America Inc., Philadelphia.

Imperial Oil Ltd.. 1978. Environmental impact statement for exploratory drilling in Davis Strait region. Unpublished report, Imperial Oil Ltd., Aquitaine Co. Canada Ltd., and Canada Cities Services Ltd. 31 pp.

Marshall Macklin Monaghan Ltd. 1982. Community tourism development plan — Pond Inlet. Unpublished report for Government of the Northwest Territories Economic Development and Tourism, Yellowknife. 79 pp.

McLaren, P.L. 1982. Spring migration and habitat use by seabirds in eastern Lancaster Sound and western Baffin Bay. Arctic 35:88–111.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Petro-Canada Ltd. 1979. Initial environmental assessment. Proposed Baffin Bay exploratory drilling program. Unpublished report, Petro-Canada Ltd., Calgary. 414 pp.

Renaud, W.E.; McLaren, P.L. 1982. Ivory Gull (*Pagophila eburnea*) distribution in late summer and autumn in eastern Lancaster Sound and western Baffin Bay. Arctic 35:141–148.

Renaud, W.E.; McLaren, P.L.; Johnson, S.R. 1982. The dovekie, *Alle alle*, as a spring migrant in eastern Lancaster Sound and western Baffin Bay. Arctic 35:118–125.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

16 – Creswell Bay

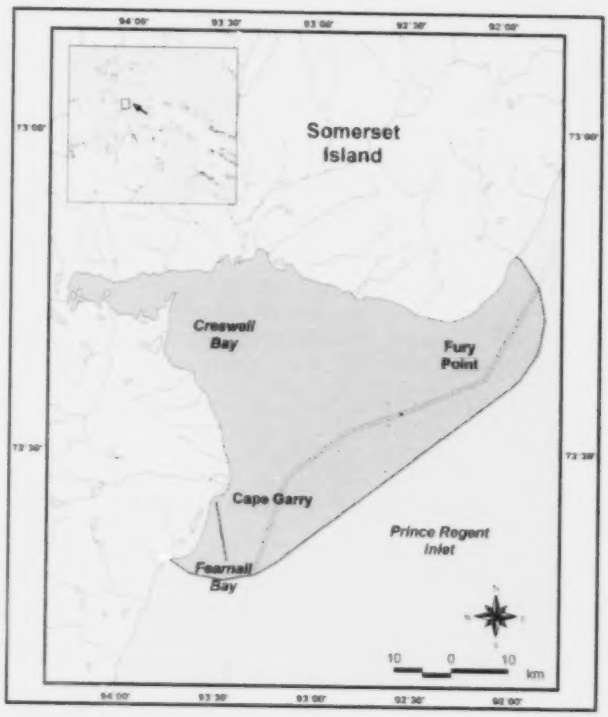
Location: 72°45'N, 93°49'W

Size: Marine – 2163 km^2; terrestrial – 2 km^2

Description: Creswell Bay is on the southeast coast of Somerset Island, approximately 75 km north of Bellot Strait. It is divided into an inner and an outer bay by a spit that originates on the south coast and extends approximately 3 km northward. The outer bay encompasses about 1000 km^2 and is bounded by the spit, Cape Garry, and Fury Point.

Creswell Bay is part of the High Arctic oceanographic zone (Nettleship and Evans 1985). Ice breakup in Prince Regent Inlet usually begins in late June. In August, pan ice in the inlet is generally forced against the western shore by the wind, while the eastern shore is ice-free (Anonymous 1968). In 1975, the fast ice had cleared from the outer portion of Creswell Bay by mid-July, and the entire bay was ice-free by the end of July (Sekarak et al. 1976). Freeze-up usually occurs in Prince Regent Inlet no later than mid-October (Smith and Rigby 1981), and over winter the marine area is covered with consolidated ice (Dickins et al. 1990).

There are strong tidal currents in the channel between the inner and outer bays during both ebb and flow tides. As a result, this area may be ice-free for all or most of the year (Sekarak et al. 1976).



Biological value: As in other sites, the distribution and abundance of marine species are a function of the prevailing ice conditions. In spring breakup, leads and polynyas may support several hundred Common Eiders *Somateria mollissima borealis*, and up to 4000 Common Eiders and King Eiders *Somateria spectabilis* may use the area as soon as there is open water (Fisheries and Oceans Canada 1999). It is difficult to identify moulting eiders by species (King and Common) during aerial surveys. Approximately 5400 eiders were observed in August 1974 (Davis et al. 1975) and 7200 in August 1975 (Alliston et al. 1976), representing about 1% of the Canadian population of either species. In July and early August, most eiders were concentrated in the inner bay; in late August, the majority were along the south shore of the outer bay. Eiders tended to be farther offshore than the Long-tailed Ducks *Clangula hyemalis*. In August 1974, 10 000 Northern Fulmars *Fulmarus glacialis* (4% of the Canadian population) were observed in outer Creswell Bay (Davis et al. 1974), and 5200 were recorded a year later (Alliston et al. 1976). Approximately 1700 Black-legged Kittiwakes *Rissa tridactyla* were observed in August 1974 (Davis et al. 1974). Kittiwakes were most abundant in the inner bay and along the north shore of the outer bay.

An estimated 2600 moulting Long-tailed Ducks were observed in Creswell Bay in August 1974, although several thousand probably moulted in the area from mid-July to late August (Davis et al. 1975). More than 4700 Long-tailed Ducks were observed during August 1975 (Alliston et al. 1976). Most of the moulting birds were concentrated along the north shore of the outer bay, east of the Creswell River, although scattered groups also occurred along the southern shore of the inner and outer bay.

Creswell Bay is the most important biological area in the Prince Regent Inlet region (Fisheries and Oceans Canada 1999). Up to 4000 beluga *Delphinapterus leucas* may be found in the outer bay and estuary of the Creswell River, and narwhal *Monodon monoceros* are present most years. Arctic char *Salvelinus alpinus* use the bay to move in and out of Stanwell Fletcher Lake. There is an outpost camp located at Creswell Bay, maintained by hunters from Resolute Bay. This is an important site from which ringed seals *Phoca hispida* and polar bears *Ursus maritimus* are hunted (Riewe 1992).

Sensitivities: Disturbances or degradation of marine habitats could have a negative impact on feeding and moulting birds. Creswell Bay is listed as having an "extremely sensitive" shoreline for oil spill damage from May through October, with marine areas being at least "highly sensitive" (Dickins et al. 1990).

Potential conflicts: None.

Status: Inner Creswell Bay is part of the Stanwell-Fletcher International Biological Programme site (Region 9, Site No. 1-3; Eng et al. 1989), and the region is an Important Bird Area in Canada (NU062; CEC 1999).

References:

Alliston, W.G.; Bradstreet, M.S.W.; McLaren, M.A.; Davis, R.A.; Richardson, W.J. 1976. Numbers and distribution of birds in the central District of Franklin, NWT: June–August, 1975. Vols. 1 and 2. Unpublished report, LGL environmental research associates for Polar Gas Project, Toronto. 587 pp.

Anonymous. 1968. Pilot of Arctic Canada. Vol. 2. Canadian Hydrological Service, Energy, Mines, and Resources Canada, Ottawa. 247 pp.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Davis, R.A.; Bradstreet, M.S.W.; Holdsworth, C.; McLaren, M.A.; Richardson, W.J. 1974. Studies of the numbers and distribution of birds in the central Canadian Arctic — 1974: a preliminary report. Unpublished report, LGL Ltd. environmental research associates for Polar Gas Project, Toronto. 238 pp.

Davis, R.A.; Finley, K.; Bradstreet, M.; Holdsworth, C.; McLaren, M. 1975. Studies of the number and distribution of birds and mammals in the central Canadian Arctic — 1974: a supplement. Unpublished report, LGL Ltd. environmental research associates for Polar Gas Project, Toronto. 205 pp.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Eng, M.; Green, J.; Little, L.; Auchterlonie, S. 1989. A review of International Biological Programme sites in the Northwest Territories. Unpublished report, International Biological Programme Working Group, Yellowknife.

Fisheries and Oceans Canada. 1999. Marine environmental handbook — Arctic and Northwest Passage. Fisheries and Oceans Canada, Ottawa. 136 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Sekarak, A.D.; Thomson, D.; Bain, H.; Acreman, J. 1976. Summer survey of the marine ecology of Creswell Bay, Somerset Island; and Assistance Bay, Cornwallis Island, NWT, 1975. Unpublished report, LGL Ltd. environmental research associates for Polar Gas Project, Toronto. 215 pp.

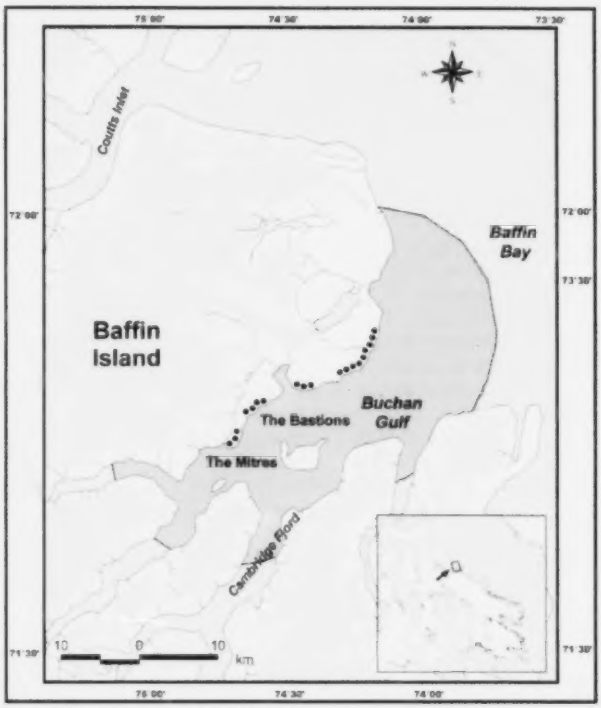
Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Location: 71°50'N, 74°30'W

Size: Marine – 653 km^2; terrestrial – 14 km^2

Description: Buchan Gulf is situated on the eastern coast of north Baffin Island, about 200 km southeast of Pond Inlet (Mittimatalik). The northern coast of the Gulf is notable for two promontories, The Bastions and The Mitres. A description of this key terrestrial habitat site is found in Alexander et al. (1991).

Buchan Gulf lies in the High Arctic oceanographic zone (Nettleship and Evans 1985). Over winter, open water develops parallel to the eastern and southeastern coast of Bylot Island (Smith and Rigby 1981). Recurring offshore leads form in sea ice off Buchan Gulf, with a relatively narrow landfast ice band (although this may vary greatly between years; McLaren 1982); the floe edge is usually not far from shore. However, landfast ice forms in the Gulf and along the eastern Baffin Island shore. Shore leads open as early as February, but may close again in April or May (Smith and Rigby 1981). Ice breakup may not occur until July, and freeze-up begins in late October.



Biological value: Buchan Gulf supported approximately 25 000 pairs of Northern Fulmars *Fulmarus glacialis*, about 11% of the Canadian population of this species, along the two promontories in the 1970s (Nettleship 1980). New surveys are needed to confirm these estimates. This fulmar colony is almost totally composed of light-phase birds, anomalous among eastern Canadian Arctic fulmar colonies (Hatch and Nettleship 1998).

A few thousand Black Guillemots *Cepphus grylle* winter in open water areas of northwest Baffin Bay (Renaud and Bradstreet 1980). A major movement into the area occurs during late May. Concentrations along the ice edge of Buchan Gulf and Scott Inlet suggest that colonies may also be situated at these sites (McLaren 1982).

King Eiders *Somateria spectabilis* and Common Eiders *S. mollissima borealis* may congregate along the ice edge during migration, usually in May (McLaren and McLaren 1982). King Eiders arrive by May, and Common Eiders return by mid-May. Numbers of both species increase throughout May, with a notable movement of King Eiders along the landfast ice edge bordering east Baffin Island. Numbers decline in late June as individuals move to terrestrial breeding areas. During July and August, numbers again increase along coasts, particularly south Lancaster Sound and the east coasts of Bylot and Baffin islands, as a series of migratory movements occur (McLaren and McLaren 1982). Up to 25 000 migrating eiders have been observed along the eastern Bylot Island / north Baffin Island region during migration (McLaren and Renaud 1979).

In May and June, fulmars are numerous at the ice edge off Cape Graham Moore (site 15) (Bradstreet 1982; McLaren 1982), perhaps because this is the nearest open water to the Scott Inlet and Buchan Gulf colonies (Brown and Nettleship 1981). Thousands of Dovekies *Alle alle* may be found in the shore leads off the coast during May migration to their breeding sites on the west coast of Greenland (Renaud et al. 1982). The Ivory Gull *Pagophila eburnea*, a species at risk in Canada, also migrates and stages along this ice edge (Bradstreet 1982). This marine region is occupied by seabirds from mid-April through October (Riewe 1992).

The marine area around Buchan Gulf is also important for many marine mammals, especially narwhals *Monodon monoceros*, ringed seals *Phoca hispida*, and polar bears *Ursus maritimus*, which use parts of this area for maternity denning (Riewe 1992).

Sensitivities: Seabirds are sensitive to disturbance at their colonies and to the pollution of offshore waters.

Potential conflicts: Baffin Bay and Davis Strait have potential to become marine shipping routes and areas of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979; DIAND 1982). This area is also of increasing importance as a tourist destination for cruise ships (Hall and Johnston 1995; Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Buchan Gulf is an International Biological Programme site (Region 9, Site No. 7-11; Nettleship 1980) and an Important Bird Area in Canada (NU069; CEC 1999).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Bradstreet, M.S.W. 1982. Occurrence, habitat use, and behavior of seabirds, marine mammals, and arctic cod at the Pond Inlet ice edge. Arctic 35:28–40.

Brown, R.G.B.; Nettleship, D.N. 1981. The biological significance of polynyas to arctic colonial seabirds. Pages 56–66 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

DIAND. 1982. The Lancaster Sound region: 1980–2000. Green Paper, Department of Indian Affairs and Northern Development, Ottawa. 102 pp.

Hall, C.M.; Johnston, M.E. 1995. Polar tourism: tourism in the Arctic and Antarctic regions. Wiley & Sons, New York.

Hatch, S.A.; Nettleship, D.N. 1998. Northern Fulmar (*Fulmarus glacialis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 361. The Birds of North America Inc., Philadelphia.

Imperial Oil Ltd. 1978. Environmental impact statement for exploratory drilling in Davis Strait region. Unpublished report, Imperial Oil Ltd., Aquitaine Co. Canada Ltd., and Canada Cities Services Ltd. 31 pp.

McLaren, P.L. 1982. Spring migration and habitat use by seabirds in eastern Lancaster Sound and western Baffin Bay. Arctic 35:88–111.

McLaren, P.L.; McLaren, M.A. 1982. Waterfowl populations in eastern Lancaster Sound and western Baffin Bay. Arctic 35:149–157.

McLaren, P.L.; Renaud, W.E. 1979. Distribution of sea-associated birds in northwest Baffin Bay and adjacent waters, May–October 1978. Vols. 1 and 2. Unpublished report, LGL Ltd. environmental research associates for Petro-Canada, Calgary. 312 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Petro-Canada Ltd. 1979. Initial environmental assessment. Proposed Baffin Bay exploratory drilling program. Unpublished report, Petro-Canada Ltd., Calgary. 414 pp.

Renaud, W.E.; Bradstreet, M.S.W. 1980. Late winter distribution of black guillemots in northern Baffin Bay and the Canadian High Arctic. Can. Field-Nat. 94:421–425.

Renaud, W.E.; McLaren, P.L.; Johnson, S.R. 1982. The dovekie, *Alle alle*, as a spring migrant in eastern Lancaster Sound and western Baffin Bay. Arctic 35:118–125.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

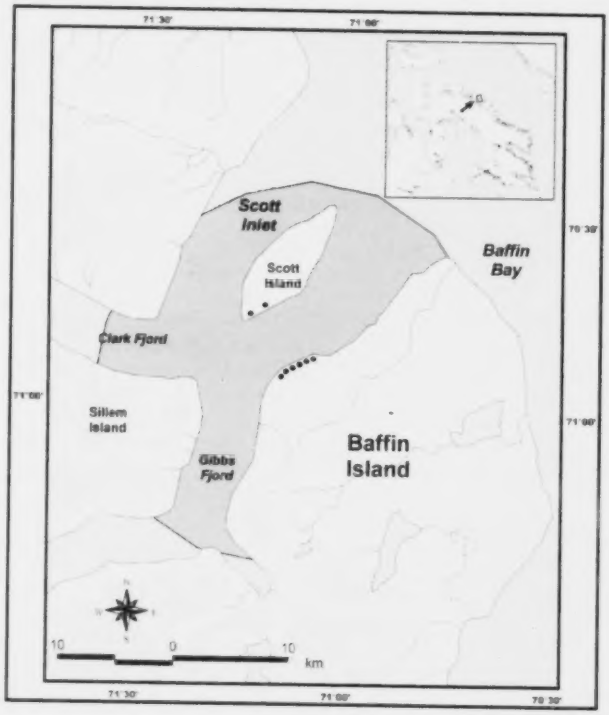
Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

Location: 71°03'N, 71°08'W

Size: Marine – 342 km^2; terrestrial – 37 km^2

Description: Scott Inlet is located on the east coast of Baffin Island, about 120 km north of Clyde River (Kangiqtugaapik). Scott Island, approximately 11 km long, is in the centre of Scott Inlet. A description of this key terrestrial habitat site is found in Alexander et al. (1991).

Scott Inlet lies in the High Arctic oceanographic zone (Nettleship and Evans 1985). Over winter, open water develops parallel to the eastern and southeastern coast of Bylot Island (Smith and Rigby 1981). Recurring offshore leads form in sea ice off Scott Inlet, with a relatively narrow landfast ice band (although this may vary greatly between years; McLaren 1982). The floe edge is usually not far from shore. However, landfast ice forms in the inlet and along the eastern Baffin Island shore. Shore leads open as early as February, but may close again in April or May (Smith and Rigby 1981). Ice breakup may not occur until July, and freeze-up begins in late October.



Biological value: Scott Inlet initially was thought to support approximately 25 000 pairs of Northern Fulmars *Fulmarus glacialis* on the coastal region south of Scott Island (Nettleship 1980), but this estimate was revised to 10 000 pairs from a 1986 survey (Hatch and Nettleship 1998). This represents about 4% of the Canadian population of this species. Like that at Buchan Gulf (site 17) to the north, this fulmar colony is almost totally composed of light-phase birds, anomalous among eastern Canadian Arctic fulmar colonies (Hatch and Nettleship 1998).

Approximately 100 pairs of Glaucous Gulls *Larus hyperboreus* nest in two colonies on southwest Scott Island (Nettleship 1980). A few thousand Black Guillemots *Cepphus grylle* winter in open water areas of northwest Baffin Bay (Renaud and Bradstreet 1980). A major movement into the area occurs during late May. Concentrations along the ice edge of Buchan Gulf and Scott Inlet suggest that colonies may also be situated at these sites (McLaren 1982). King Eiders *Somateria spectabilis* and Common Eiders *S. mollissima borealis* may congregate along the ice edge during migration, usually in May (McLaren and McLaren 1982). Up to 25 000 migrating eiders have been observed along the eastern Bylot Island / north Baffin Island region during migration (McLaren and Renaud 1979).

In May and June, fulmars are numerous at the ice edge off Cape Graham Moore (Bradstreet 1982; McLaren 1982), perhaps because this is the nearest open water to the Scott Inlet and Buchan Gulf colonies (Brown and Nettleship 1981). Thousands of Dovekies *Alle alle* may be found in the shore leads off the coast during the May migration to their breeding sites on the west coast of Greenland (Renaud et al. 1982). The Ivory Gull *Pagophila eburnea*, a species at risk in Canada, also migrates and stages along this ice edge (Bradstreet 1982). This marine region is occupied by seabirds from mid-April through October (Riewe 1992).

The marine area around Scott Inlet is also important for many marine mammals, especially narwhal *Monodon monoceros*, beluga *Delphinapterus leucas*, harp seal *Phoca groenlandica*, bearded seal *Erignathus barbatus*, ringed seal *Phoca hispida*, and polar bears *Ursus maritimus*, which use parts of this area for maternity denning (Riewe 1992).

Sensitivities: Seabirds are sensitive to disturbance at their colonies and to the pollution of offshore waters.

Potential conflicts: Baffin Bay and Davis Strait have potential to become marine shipping routes and areas of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979). This area is also of increasing importance as a tourist destination for cruise ships (Hall and Johnston 1995; Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Scott Inlet is an International Biological Programme site (Region 9, Site No. 7-8; Nettleship 1980) and an Important Bird Area in Canada (NU070; CEC 1999).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Bradstreet, M.S.W. 1982. Occurrence, habitat use, and behavior of seabirds, marine mammals, and arctic cod at the Pond Inlet ice edge. Arctic 35:28–40.

Brown, R.G.B.; Nettleship, D.N. 1981. The biological significance of polynyas to arctic colonial seabirds. Pages 56–66 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Hall, C.M.; Johnston, M.E. 1995. Polar tourism: tourism in the Arctic and Antarctic regions. Wiley & Sons, New York.

Hatch, S.A.; Nettleship, D.N. 1998. Northern Fulmar (*Fulmarus glacialis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 361. The Birds of North America Inc., Philadelphia.

Imperial Oil Ltd. 1978. Environmental impact statement for exploratory drilling in Davis Strait region. Unpublished report, Imperial Oil Ltd., Aquitaine Co. Canada Ltd., and Canada Cities Services Ltd. 31 pp.

McLaren, P.L. 1982. Spring migration and habitat use by seabirds in eastern Lancaster Sound and western Baffin Bay. Arctic 35:88–111.

McLaren, P.L.; McLaren, M.A. 1982. Waterfowl populations in eastern Lancaster Sound and western Baffin Bay. Arctic 35:149–157.

McLaren, P.L.; Renaud, W.E. 1979. Distribution of sea-associated birds in northwest Baffin Bay and adjacent waters, May–October 1978. Vols. 1 and 2. Unpublished report, LGL Ltd. environmental research associates for Petro-Canada, Calgary. 312 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Petro-Canada Ltd. 1979. Initial environmental assessment. Proposed Baffin Bay exploratory drilling program. Unpublished report, Petro-Canada Ltd., Calgary. 414 pp.

Renaud, W.E.; Bradstreet, M.S.W. 1980. Late winter distribution of black guillemots in northern Baffin Bay and the Canadian High Arctic. Can. Field-Nat. 94:421–425.

Renaud, W.E.; McLaren, P.L.; Johnson, S.R. 1982. The dovekie, *Alle alle*, as a spring migrant in eastern Lancaster Sound and western Baffin Bay. Arctic 35:118–125.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

19 – Amundsen Gulf and Cape Bathurst Polynya

Location: 71°00'N, 125°00'W

Size: Marine – 30 700 km^2; terrestrial – 29 km^2

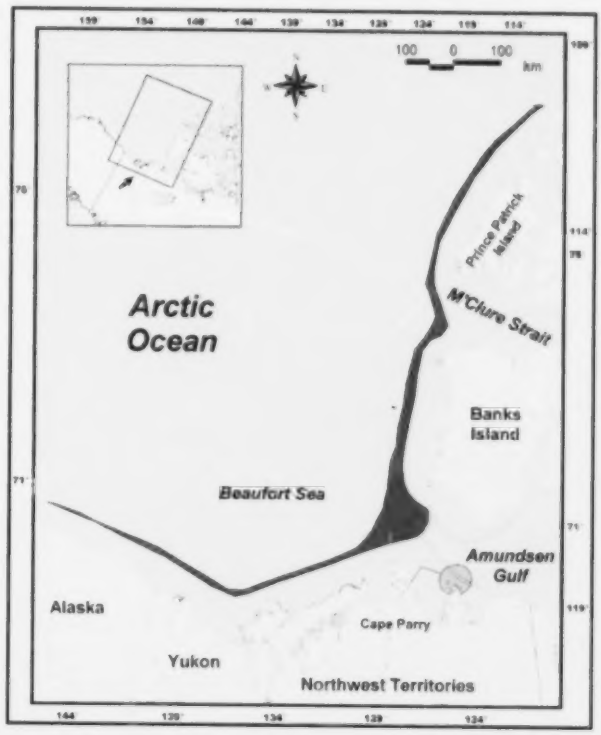
Description: This marine area includes the recurring polynya that forms in western Amundsen Gulf between Cape Bathurst, Cape Parry, Cape Lambton, and Cape Kellett. It also includes associated leads along the south and west sides of Banks Island and from Cape Bathurst eastward, past Cape Parry, along the southern coast of Amundsen Gulf and the Tuktoyaktuk Peninsula to Kugmallit Bay. Marine currents and a variable bathymetry result in marine upwellings that produce a rich marine environment in the vicinity of Cape Parry.

This site lies in the Low Arctic oceanographic zone (Nettleship and Evans 1985). A recurrent crack and lead system develops in the Beaufort Sea, between the landfast ice and Arctic pack ice. This persistent lead coincides with the 30-m depth contour and changes its position very little from year to year (Marko 1975). Freeze-up occurs between mid-October and mid-November, but patches of open water and new ice occur frequently during the winter. By mid-May, open water is continuous from Cape Bathurst to Mackenzie Bay. Breakup, which is characterized by progressive widening of the lead system, usually commences in mid-June (Smith and Rigby 1981; Alexander et al. 1997).

Associated with the lead system along the Beaufort Sea is the polynya and lead system in Amundsen Gulf. Some open water can be found in virtually all months somewhere in western Amundsen Gulf. Open water can appear as early as December, although a characteristic form of the polynya does not appear until April. Freeze-up occurs between mid-October and mid-November. By mid-December, a characteristic pattern of cracks and leads starts to develop along the fast-ice boundary, which follows the edge of the continental shelf. This system extends right around Amundsen Gulf. An open lead develops on the eastern side of Cape Bathurst sometime in January, coinciding with the appearance of open water just north of Cape Parry. Open water remains in the general area until late May or early June, when the ice between Cape Bathurst and Cape Kellett begins to disintegrate. With the advance of breakup, the open water between Cape Bathurst and Cape Kellett enlarges into Amundsen Gulf (Smith and Rigby 1981).

The most critical areas for marine birds are patches of open water less than 25 m in depth (Barry et al. 1981). Such conditions generally occur in the vicinity of Cape Parry and the Booth Islands and along the west coast of Banks Island from Cape Kellett to Big River. The extent of open water that is quite variable from year to year is reflected in the numbers and densities of marine birds.

Biological value: Five key terrestrial habitat sites occur around this marine region (Alexander et al. 1991), most of which are key waterfowl sites. However, one key terrestrial site, the cliffs at Cape Parry, provides nesting habitat for the only Thick-billed Murre *Uria lomvia arra* colony in the western Canadian Arctic (Johnson and Ward 1985). This colony of 800 birds is the only known breeding colony of this subspecies in Canada.



While some seabirds use this marine region, it is a critical area for Arctic waterfowl. The recurrent leads serve as a migration corridor for marine birds, and the polynya near Cape Bathurst serves as a major staging area (Alexander et al. 1997). In the shore lead west of Banks Island, 16 000 King Eiders *Somateria spectabilis* were observed in 1981 (2.5% of the Canadian population; Barry and Barry 1982). In June, nearly 20 000 King Eiders concentrate in the open water near the Fiji and Canoe islands (3% of the Canadian population; Barry et al. 1981). Single-day surveys in 1992 and 1993 recorded 63 000 and 39 000 King Eiders (10% and 6% of the Canadian population, respectively) in waters near the Baillie Islands and off western Banks Island (Alexander et al. 1997). Common Eiders *Somateria mollissima v-nigra* typically frequent the southern portion of this marine area and are specifically concentrated around the Baillie, Fiji, and Canoe islands (Barry et al. 1981). In 1974, 50 000 Common Eiders were observed in a large lead near Cape Dalhousie (50% of the Canadian population of *v-nigra*; Barry 1976), and 75 000 were in leads north of Liverpool Bay at the same time (Searing et al. 1975). Approximately 25 000 Common Eiders were observed near the Baillie Islands in 1993 (36% of the Canadian *v-nigra* population; Alexander et al. 1997).

Over 24 000 Long-tailed Ducks *Clangula hyemalis* were observed in the shore lead west of Storkerson Bay in 1974 (Searing et al. 1975), representing perhaps 1% of the Canadian population. Approximately 17 000 Long-tailed Ducks were in the same lead as the eiders near Cape Dalhousie (Barry 1976). The coastal waters off the Tuktoyaktuk Peninsula are an important area for moulting seaducks. Approximately 40 000 Long-tailed Ducks were observed in

Liverpool Bay in August 1972 (Barry 1976). The Nunaluk Spit area, from Tuktoyaktuk to Hutchison Bay, and the coast of Atkinson Point to Cape Bathurst are also used by moulting birds. Up to 160 000 Long-tailed Ducks (6% of the Canadian population) have been documented in these areas from late July to mid-August (Barry et al. 1981; Barry and Barry 1982).

Some Black Guillemots *Cepphus grylle* nest near Cape Parry, one of the few nesting sites in the western Arctic (Barry et al. 1981; Johnson and Ward 1985). Glaucous Gulls *Larus hyperboreus* and Yellow-billed Loons *Gavia adamsii* commonly use nearshore areas in the spring (Barry and Barry 1982; Alexander et al. 1988b). There is some evidence that Ivory Gulls *Pagophila eburnea* and Ross' Gulls *Rhodostethia rosea* may overwinter in the offshore leads in some years (Barry 1976).

The offshore areas are important for bearded seals *Erignathus barbatus*, ringed seals *Phoca hispida*, polar bears *Ursus maritimus*, belugas *Delphinapterus leucas*, and bowhead whales *Balaena mysticetus* (Alexander et al. 1991).

Sensitivities: Migrating seabirds are heavily dependent upon open leads for feeding and resting. The degradation of these open water areas could result in severe negative impacts on the birds. Offshore foraging areas for marine birds are susceptible to pollution and disturbance from increased ship traffic.

Potential conflicts: Extensive offshore drilling and ship traffic occur throughout the area, although mostly west of Hutchison Bay (Alexander et al. 1997). Exploitation of hydrocarbon resources in the Beaufort Sea increases the possibilities of oil spills in these sensitive areas.

Status: The Kugaluk River and estuary, Anderson River Delta, and Cape Parry are Canadian International Biological Programme sites (Region 9, Site Nos. 4-4, 4-3, and 4-11; Eng et al. 1989). Anderson River Delta, Cape Parry, and Banks Island #1 are Migratory Bird Sanctuaries. The Cape Bathurst Polynya, Cape Parry, Harrowby Bay, Anderson River Delta, Kugaluk River, Mackenzie River Delta, and Banks Island western shore are Canadian Important Bird Areas (NT039, NT041, NT040, NT038, NT037, NT016, NT017; CEC 1999).

References:

Alexander, S.A.; Barry, T.W.; Dickson, D.L.; Prus, H.D.; Smyth, K.E. 1988a. Key areas for birds in coastal regions of the Canadian Beaufort Sea. Unpublished report, Canadian Wildlife Service, Edmonton. 146 pp.

Alexander, S.A.; Ealey, D.M.; Barry, S.J. 1988b. Spring migration of eiders, oldsquaws, and glaucous gulls along offshore leads of the Canadian Beaufort Sea. Can. Wildl. Serv. Tech. Rep. No. 56.

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Alexander, S.A.; Dickson, D.L.; Westover, S.E. 1997. Spring migration of eiders and other waterbirds in offshore areas of the western Arctic. Pages 6–20 *in* D.L. Dickson (ed.), King and Common eiders of the western Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 94, Ottawa.

Barry, T.W. 1976. Seabirds of the southeastern Beaufort Sea: Summary report. Technical Report No. 3A, Beaufort Sea Project, Department of the Environment, Victoria. 41 pp.

Barry, S.J.; Barry, T.W. 1982. Seabird surveys in the Beaufort Sea, Amundsen Gulf, and Prince of Wales Strait, 1981 season. Unpublished report, Canadian Wildlife Service for Dome Ltd. and Esso Resources Canada Ltd., Edmonton. 52 pp.

Barry, T.W.; Barry, S.J.; Jacobson, B. 1981. Seabird survey in the Beaufort Sea, Amundsen Gulf, Prince of Wales Strait, and Viscount Melville Sound, 1980 season. Unpublished Report CWS-81-003, Canadian Wildlife Service, Edmonton. 69 pp.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Eng, M.; Green, J.; Little, L.; Auchterlonie, S. 1989. A review of International Biological Programme sites in the Northwest Territories. Unpublished report, International Biological Programme Working Group, Yellowknife.

Johnson, S.R.; Ward, J.G. 1985. Observations of Thick-billed Murres (*Uria lomvia*) and other seabirds at Cape Parry, Amundsen Gulf, NWT. Arctic 38:112–115.

Marko, J. 1975. Satellite observation of the Beaufort Sea ice cover. Unpublished Report No. 34, Beaufort Sea Project, Department of the Environment, Victoria. 137 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Searing, G.E.; Kuyt, E.; Richardson, W.T.; Barry, T.W. 1975. Seabirds of the southeastern Beaufort Sea: aircraft and ground observation in 1972 and 1974. Technical Report No. 36, Beaufort Sea Project, Department of the Environment, Victoria. 257 pp.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Location: 68°35'N, 114°00'W

Size: Marine – 368 km^2; terrestrial – 0 km^2

Description: The Lambert Channel is a narrow stretch of water between Dolphin and Union Strait and Coronation Gulf, near the community of Kugluktuk (Coppermine), and lies in the Low Arctic oceanographic zone (Nettleship and Evans 1985). A small polynya occurs in southern Dolphin and Union Strait between Victoria Island and the mainland. The appearance of open water is variable, ranging from February to June. Open water usually appears first on the southwestern side of Lambert and Camping islands and remains until breakup commences in the first part of July. Lambert Channel begins to freeze before the eastern side of Dolphin and Union Strait and is usually ice-covered by the end of October or the beginning of November (Smith and Rigby 1981). Lambert Channel is very shallow in places and contains numerous shoals. Hydrographic charts indicate that it has a strong current with heavy tidal rips (Smith and Rigby 1981).

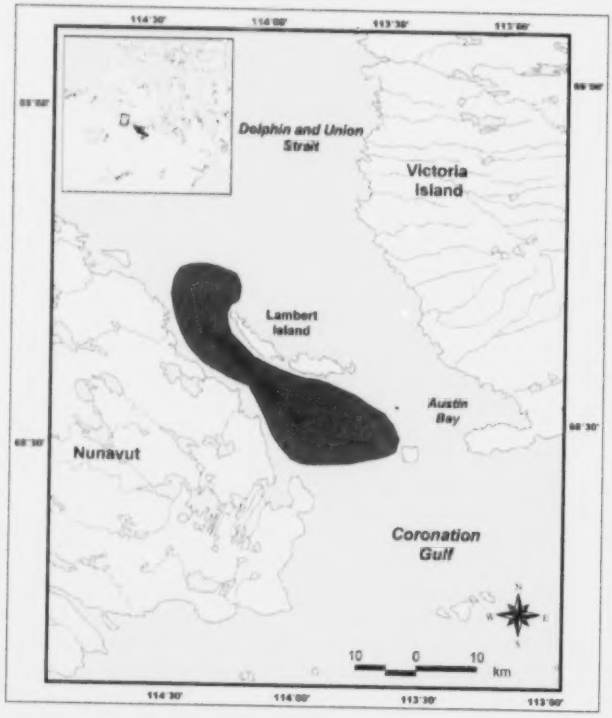
Biological value: Over 70 000 Common Eiders *Somateria mollissima v-nigra* were observed in this area from 6 to19 June 1980, with roughly 18 000 eiders observed in 1 day. About 90% of the birds were resting and feeding, suggesting that it is a critical feeding area prior to nest initiation (Allen 1982). The total observed eiders represented about 70% of the Canadian population of this subspecies at that time. That survey also recorded approximately 5000 Long-tailed Ducks *Clangula hyemalis*, with more than 2000 birds observed on 1 day (Allen 1982). On 9 June 1993, 64 000 Common Eiders (at least 64% of the Canadian *v-nigra* population) were observed in the polynya, most concentrated in the shallow, southeast end (Alexander et al. 1997). Over 250 Yellow-billed Loons *Gavia adamsii* were observed in the polynya in June 1992 (Alexander et al. 1997). Lesser numbers of geese, other ducks, and raptors also migrate through the area, and many waterfowl nest in the surrounding islands (Riewe 1992).

Ringed seals *Phoca hispida* are common in this area, and low numbers of bearded seals *Erignathus barbatus* are also present (Riewe 1992). This area is a heavily used hunting route for nearby Inuit communities (Fisheries and Oceans Canada 1999).

Sensitivities: Migrating marine waterfowl are heavily dependent upon shore leads and polynyas for feeding and resting. Degradation of this site could have a significant impact on populations moving through the area.

Potential conflicts: None.

Status: The islands in Dolphin and Union Strait are an International Biological Programme site (Region 9, Site No. 3-6; Eng et al. 1989).



References:

Alexander, S.A.; Dickson, D.L.; Westover, S.E. 1997. Spring migration of eiders and other waterbirds in offshore areas of the western Arctic. Pages 6–20 *in* D.L. Dickson (ed.), King and Common eiders of the western Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 94, Ottawa.

Allen, D.L. 1982. Bird migration and nesting observations, western Victoria Island, NWT — June 1980. Unpublished report, Canadian Wildlife Service, Yellowknife. 61 pp.

Eng, M.; Green, J.; Little, L.; Auchterlonie, S. 1989. A review of International Biological Programme sites in the Northwest Territories. Unpublished report, International Biological Programme Working Group, Yellowknife.

Fisheries and Oceans Canada. 1999. Marine environmental handbook — Arctic and Northwest Passage. Fisheries and Oceans Canada, Ottawa. 136 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Location: 68°35'N, 113°00'W

Size: Marine – 368 km²; terrestrial – 0 km²

Description: The Lambert Channel is a narrow stretch of water between Dolphin and Union Strait and Coronation Gulf, near the community of Kugluktuk (Coppermine), and lies in the Low Arctic oceanographic zone (Nettleship and Evans 1985). A small polynya occurs in southern Dolphin and Union Strait between Victoria Island and the mainland. The appearance of open water is variable, ranging from February to June. Open water usually appears first on the southwestern side of Lambert and Camping islands and complete ice breakup commences in the first part of July. Lambert Channel begins to freeze before the eastern side of Dolphin and Union Strait and is usually ice-covered by the end of October or the beginning of November (Smith and Rigby 1981). Lambert Channel is very shallow in places and contains numerous shoals. Hydrographic charts indicate that it has a strong current with heavy tidal rips (Smith and Rigby 1981).

Biological value: Over 70 000 Common Eiders *Somateria mollissima v-nigra* were observed in this area from 6 to 19 June 1980, with roughly 18 000 eiders observed on 7 June. About 90% of the birds were resting and feeding, suggesting that it is a critical feeding area prior to the ice breakup (Allen 1982). The total observed eiders represented about 70% of the Canadian population of this subspecies at that time. That survey also recorded approximately 5000 Long-tailed Ducks *Clangula hyemalis*, with more than 2000 birds observed on 1 day (Allen 1982). On 9 June 1993, 64 000 Common Eiders (at least 64% of the Canadian *v-nigra* population) were observed in the polynya, most concentrated in the shallow southeast end (Alexander et al. 1997). Over 250 Yellow-billed Loons *Gavia adamsii* were observed in the polynya in June 1992 (Alexander et al. 1997). Lesser numbers of several other ducks and raptors also migrate through the area, and many waterfowl nest in the surrounding islands (Riewe 1992).

Ringed seals *Phoca hispida* are common in the area, and low numbers of bearded seals *Erignathus barbatus* are also present (Riewe 1992). This area is a heavily used hunting route for nearby Inuit communities (Fisheries and Oceans Canada 1989).

Sensitivities: Migrating marine waterfowl are heavily dependent upon shore leads and polynyas for feeding and resting. Degradation of this site could have a significant impact on populations moving through the area.

Potential conflicts: None.

Status: The islands in Dolphin and Union Strait are an International Biological Programme site (Region 9, Site No. 3) (Ing et al. 1980).

References:

Alexander, S.A., Dickson, D.L., Westover, R.L. 1997. Spring migrations of eiders and other waterfowl in offshore areas of the western Arctic. Pages 6–20 in D.L. Dickson and J. Kingsley, Common eiders of the western Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 94. Ottawa.

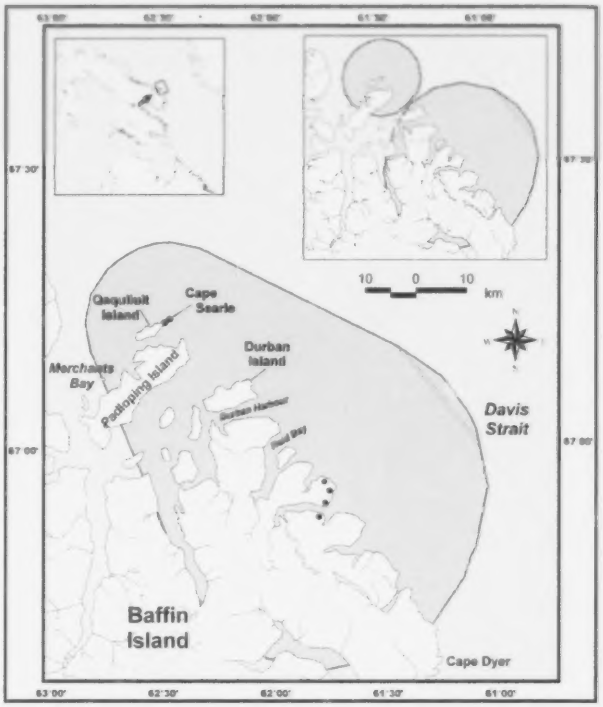
Location: 67°05'N, 62°00'W

Size: Marine – 2747 km^2; terrestrial – 94 km^2

Description: Cape Searle is located on the northeastern tip of Qaqulluit Island in Merchants Bay, eastern Baffin Island, approximately 100 km southeast of Qikiqtarjuaq (Broughton Island). Reid Bay is situated approximately 130 km southeast of Qikiqtarjuaq and 37 km northeast of Cape Dyer, on the eastern tip of the Cumberland Peninsula of Baffin Island. The name "Reid Bay" is actually a misnomer — the key terrestrial habitat site is located on the promontory overlooking the next fjord south of this bay (Akpait Fjord). The location of the colonies is known as "The Minarets" to the seabird community (Gaston and Smith 1987) and as "Akpait" to the local Inuit community (Mallory, unpubl. data). Cape Searle is locally known as "Qaqulluit." This marine region is near the southern limit of the High Arctic oceanographic zone (Nettleship and Evans 1985). The terrestrial characteristics of Cape Searle and Reid Bay are described in Alexander et al. (1991). Hereafter, we refer to the seabird colonies as Qaqulluit and Akpait, but geographic features are identified by their gazetteer names of Cape Searle and Reid Bay.

Landfast ice generally forms near Cape Searle and Reid Bay by late October and has spread seaward beyond 60°W by mid-December. In April, the polynya in Cumberland Sound expands, and shore leads extend north along the landfast ice margin of eastern Baffin Island up past Cape Dyer, not far from these sites (Smith and Rigby 1981). Water currents flow south along the eastern coast of Baffin Island. The floe edge is often close to shore in this region, and piled pack ice can be extensive during spring breakup. However, the nearby fjords and bays (Padle, Merchants, Durban) usually stay frozen until late June. Depending on the year, pack ice can remain in this area well into August (MacLaren Atlantic Inc. 1978).

A deep ocean trough (>200 fathoms) lies just south of Cape Searle, between Padloping and Durban islands. With good navigation nearby, Durban Island was the site of a Distant Early Warning station, and a U.S. Coast Guard Station was on southwestern Padloping Island. This site became the local community until the late 1960s, when people were relocated to Broughton Island, so that human activity around Qaqulluit Island has decreased substantially in the last three decades (Mallory, unpubl. data).



Biological value: Qaqulluit is purported to be Canada's largest colony of Northern Fulmars *Fulmarus glacialis*, at approximately 100 000 pairs (Nettleship 1980; Alexander et al. 1991). However, this estimate was based on a single survey from 1973. Wynne-Edwards (1952) had previously estimated at least 200 000 fulmars at the site. Watson (1957) revised this estimate dramatically downward to 25 000 birds, although he conducted his survey on 22 May, which may be a time when fulmars are away from the colony (Hatch and Nettleship 1998). Recent survey estimates (2001) have the colony at approximately 53 000 pairs (Mallory, unpubl. data). If this estimate is accurate, the Qaqulluit colony represents approximately 22% of the Canadian population, not 27% as suggested previously (Alexander et al. 1991). Glaucous Gulls *Larus hyperboreus*, Iceland Gulls *Larus glaucoides*, and Black Guillemots *Cepphus grylle* are also numerous here (Nettleship 1980).

Akpait is one of Canada's largest Thick-billed Murre *Uria lomvia* colonies, estimated at 133 000 pairs, or about 10% of the Canadian population in 1985 (Gaston and Smith 1987), somewhat smaller than the original estimate of 200 000 pairs (Nettleship 1980). Nonetheless, it is one of the five largest Thick-billed Murre colonies in Canada (Gaston and Hipfner 2000). Approximately 10 000 pairs of Northern Fulmars, or 4% of the Canadian population, also breed at Akpait (Nettleship 1980; Alexander et al. 1991). About 1200 pairs of Black-legged Kittiwakes *Rissa tridactyla* nest at the site (Gaston and Smith 1987). Glaucous Gulls and Black Guillemots also occur (Nettleship 1980). Inuit traditional knowledge suggests that Atlantic Puffins *Fratercula arctica* occur here (Mallory, unpubl. data), although they have not been reported in CWS surveys (Nettleship 1980; Gaston and Smith 1987).

This marine region is used by seabirds from mid-April through October (Wynne-Edwards 1952). Significant concentrations of marine birds may be distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (MacLaren Atlantic Ltd. 1978; Riewe 1992). The fulmars of Qaqulluit forage within 80 km of this colony (Wynne-Edwards 1952; Mallory, unpubl. data). However, numerous other birds forage within a few kilometres of the colony, especially guillemots, Common Eiders *Somateria mollissima*, Canada Geese *Branta canadensis*, Glaucous Gulls, and Common Ravens *Corvus corax* (Mallory, unpubl. data). In late June 1977, approximately 13 000 murres were concentrated in an open lead at the base of Akpait (MacLaren Atlantic Inc. 1978). Murres

from Akpait have been observed up to 10 km offshore from the colony north to Broughton Island and are found regularly just north of Qaqulluit (Mallory, unpubl. data).

This marine area is also important for many marine mammals, especially walrus *Odobenus rosmarus*, ringed seal *Phoca hispida*, bearded seal *Erignathus barbatus*, harp seal *Phoca groenlandica*, and polar bear *Ursus maritimus* (Wynne-Edwards 1952; Stirling et al. 1980; Riewe 1992). Bowhead whales *Balaena mysticetus* are also commonly observed here (Mallory, unpubl. data).

Sensitivities: Nesting seabirds are sensitive to disturbance and the pollution of their feeding areas.

Potential conflicts: Western Baffin Bay and Davis Strait have potential to become marine shipping routes and areas of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979). There is also increasing activity by cruise ships in the eastern Arctic (Wakelyn 2001). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Cape Searle and Reid Bay are recognized as International Biological Programme sites (Region 9, Site Nos. 7-6 and 7-9; Nettleship 1980) and are Important Bird Areas in Canada (NU003, NU072; CEC 1999). Between 1998 and 2003, the community of Qikiqtarjuaq has been actively working with CWS in field work and planning meetings to create a National Wildlife Area for Qaqulluit and Akpait.

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Gaston, A.J.; Hipfner, J.M. 2000. Thick-billed Murre (*Uria lomvia*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 497. The Birds of North America Inc., Philadelphia.

Gaston, A.J.; Smith, S.A. 1987. Seabirds in the Cape Dyer – Reid Bay area of Cumberland Peninsula, Baffin Island, Northwest Territories. Can. Field-Nat. 101:49–55.

Hatch, S.A.; Nettleship, D.N. 1998. Northern Fulmar (*Fulmarus glacialis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 361. The Birds of North America Inc., Philadelphia.

Imperial Oil Ltd. 1978. Environmental impact statement for exploratory drilling in Davis Strait region. Unpublished report, Imperial Oil Ltd., Aquitaine Co. Canada Ltd., and Canada Cities Services Ltd. 31 pp.

MacLaren Atlantic Inc. 1978. Report on aerial surveys 77-2, 77-3, 77-4. Studies of seabird and marine mammals in Davis Strait, Hudson Strait, and Ungava Bay. Vols. 1 and 2. Unpublished report for Imperial Oil Ltd., Aquitaine Co. Ltd., and Canada Cities Services Ltd., Calgary. 127 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Petro-Canada Ltd. 1979. Initial environmental assessment. Proposed Baffin Bay exploratory drilling program. Unpublished report, Petro-Canada Ltd., Calgary. 414 pp.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Stirling, I.; Calvert, W.; Andriashek, D. 1980. Population ecology studies of the polar bear in the area of southeastern Baffin Island. Can. Wildl. Serv. Occas. Pap. No. 44, Ottawa. 31 pp.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

Watson, A. 1957. Birds in Cumberland Peninsula, Baffin Island. Can. Field-Nat. 71:87–109.

Wynne-Edwards, V.C. 1952. The fulmars of Cape Searle. Arctic 5:105–117.

Location: 67°00'N, 80°00'W

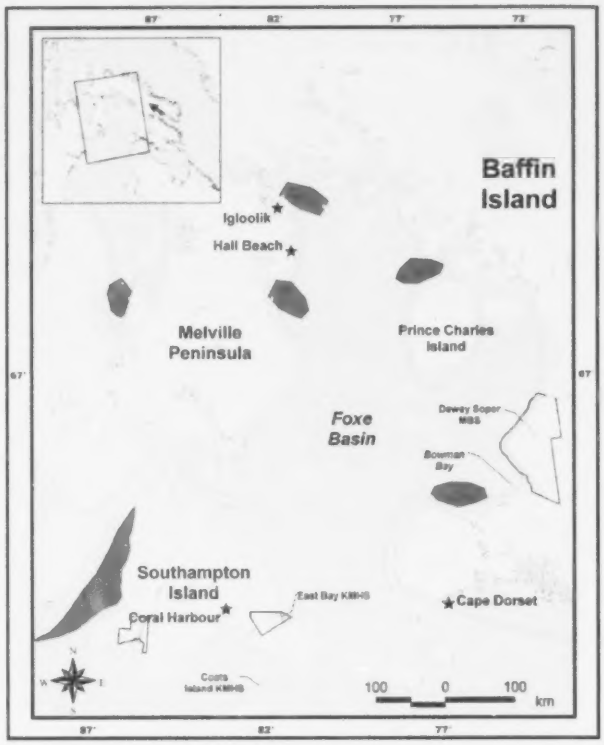
Size: Insufficient data to delineate marine area

Description: Foxe Basin is a huge, relatively shallow inlet located between Baffin Island, the Melville Peninsula, and Southampton Island. It includes many low-lying coastal areas that have emerged through isostatic uplift in the past 2000 years (Gaston et al. 1986). It is approximately 600 km long by 400 km wide and contains a series of key terrestrial habitat sites, including Prince Charles, Air Force, Foley, North and South Spicer, and Turton islands (Alexander et al. 1991).

Foxe Basin is located in the High Arctic oceanographic zone (Nettleship and Evans 1985). Ice freeze-up begins in northwestern Foxe Basin in mid-October and moves south to Southampton Island by mid-November. This is typically annual ice, with fast ice formed around islands and the shoreline (Smith and Rigby 1981). However, wind, tide, and current keep the pack ice in motion. By January, a pattern of cracks and leads develops; from February to April, polynyas and leads develop off Rowley, Spicer, Prince Charles, Air Force, Igloolik, and Jens Munk islands. These expand and link up through May. Ice usually clears Foxe Basin through Foxe and Hudson straits by August through September.

Biological value: Several biological surveys have been conducted in this region, including those by Ellis and Evans (1960), Reed et al. (1980), and Gaston et al. (1986). Reed et al. (1980) reported large numbers of moulting Atlantic Brant *Branta bernicla hrota* on Prince Charles and Air Force islands in 1979, and 2300 brant were observed in coastal areas of these islands in 1983 (Gaston et al. 1986). V. Johnston (unpubl. data) conducted aerial surveys of Prince Charles and Air Force islands in 1996 and 1997 and estimated a population of approximately 20 000 brant (11% of the Canadian population). K. Dickson (pers. commun.) has observed approximately 25 000 brant moulting along the coast by the Koukdjuak River in a year of failed breeding in the eastern Arctic, which probably include birds from the islands to the north and represent as much as 14% of the Canadian population.

Coastal areas of Prince Charles, Air Force, and Foley islands also supported approximately 3700 Sabine's Gulls *Xema sabini* (Gaston et al. 1986), which could represent 18% of the Canadian population of this species. Between 5000 and 10 000 Sabine's Gulls may nest on the Great Plains of the Koukdjuak (D. Caswell, pers. commun.). An estimated 36 000 Sabine's Gulls occupied Prince Charles and Air Force islands in 1996 and 1997 (V. Johnston, unpubl. data). This is the largest known concentration of Sabine's Gulls in the world. Johnston estimated a breeding population of approximately 120 000 pairs of Red Phalaropes *Phalaropus fulicarius*, a shorebird species that regularly uses offshore waters. This is also the largest known breeding concentration of this species in the world, perhaps representing 28% of the global population (V. Johnston, pers. commun.). Canadian and globally significant numbers of a variety of other shorebirds also occur on these islands.



Gull colonies, principally Thayer's or Kumlien's (races of the Iceland Gull *Larus glaucoides*), with a few Glaucous Gulls *Larus hyperboreus* intermixed, are scattered along the western coast of Foxe Basin in colonies ranging from a few birds to 2000 pairs (Gaston et al. 1986). Colonies of Arctic Terns *Sterna paradisaea* are distributed around Foxe Basin, with some colonies of more than 500 birds located near Fury and Hecla Strait (Gaston et al. 1986). Black Guillemots *Cepphus grylle* occur north of Southampton Island and near Fury and Hecla Strait, but in unknown numbers (Gaston et al. 1986). Some guillemots overwinter in Foxe Basin polynyas (Ellis and Evans 1960). Colonies of Common Eiders *Somateria mollissima borealis* occur near Turton Island (estimated 1500 pairs; Gaston et al. 1986; Alexander et al. 1991), White Island, and Jens Munk Island. Gaston et al. (1986) also observed thousands of King Eiders *Somateria spectabilis*, mostly males, in northern Foxe Basin, and they surmised that this area must be an important moulting location for this species.

No major colonies of murres, fulmars, or kittiwakes are known to occur around Foxe Basin (Nettleship 1980). Given that many of the recent surveys have been brief, further studies are needed to ascertain the distribution of birds in marine areas in this region.

The polynyas and shore leads of Foxe Basin are important overwintering or migratory corridors for many marine mammals, particularly those in the northern part near Fury and Hecla Strait (Stirling et al. 1981). Walrus *Odobenus rosmarus*, ringed seal *Phoca hispida*, bearded seal *Erignathus barbatus*, beluga *Delphinapterus leucas*, narwhal *Monodon monoceros*, and bowhead whale *Balaena*

mysticetus all frequent this area, often in high densities. Polar bears *Ursus maritimus* are also common (Riewe 1992).

Sensitivities: Marine birds are sensitive to disturbance at their colonies and to the pollution of offshore waters.

Potential conflicts: None.

Status: Prince Charles and Air Force islands and the Great Plains of the Koukdjuak are Canadian Important Bird Areas (NU011, NU078; CEC 1999), and the Dewey Soper Migratory Bird Sanctuary and Bowman Bay Wildlife Sanctuary are located along the shore of eastern Foxe Basin.

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Ellis, D.V.; Evans, J. 1960. Comments on the distribution and migration of birds in Foxe Basin, Northwest Territories. Can. Field-Nat. 74:59–70.

Gaston, A.J.; Decker, R.; Cooch, F.G.; Reed, A. 1986. The distribution of larger species of birds breeding on the coasts of Foxe Basin and northern Hudson Bay, Canada. Arctic 39:285–296.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Reed, A.; Dupuis, P.; Fischer, K.; Moser, J. 1980. An aerial survey of breeding geese and other wildlife in Foxe Basin and northern Baffin Island, Northwest Territories, July 1979. Can. Wildl. Serv. Prog. Notes No. 114, Ottawa. 21 pp.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Stirling, I.; Cleator, H.; Smith, T.G. 1981. The mammals. Pages 45–58 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Location:

Size:

Description:

Biological value:

Sensitivities: Seabirds are sensitive to disturbance and pollution from shipping and oil drilling activities.

Potential conflicts:

Status:

References:

Location: 65°30'N, 63°00'W

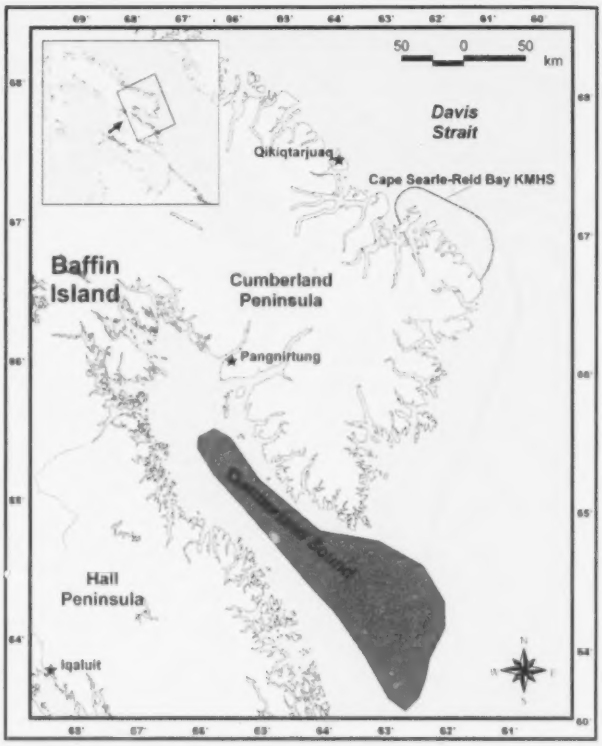
Size: Marine – 12 000 km^2; terrestrial – 0 km^2

Description: This area includes the waters of Cumberland Sound and Davis Strait from approximately 63°N to 68°N, at the northern boundary of the Low Arctic oceanographic zone (Nettleship and Evans 1985). Landfast ice generally forms in the fjords and along the coast by late October. By mid-December, the ice has spread seaward to beyond 60°W. However, a recurrent polynya remains at the mouth of Cumberland Sound. Extensive leads and shifting pack ice are also associated with the polynya. In April, the polynya expands and shore leads extend in either direction along the landfast ice margin of eastern Baffin Island (Smith and Rigby 1981). Much of the ice has disappeared by mid-summer, although pack ice may persist in the vicinity of Cape Dyer (MacLaren Atlantic Ltd. 1978). The last coastal ice has disappeared by late August.

Biological value: The best information on bird use of Cumberland Sound comes from extensive surveys conducted in the late 1970s (MacLaren Atlantic Ltd. 1978). Two major seabird colonies, Cape Searle and Reid Bay (The Minarets) (site 21), lie approximately 250 km away on the northern side of the Cumberland Peninsula (Nettleship 1980). These colonies have supported approximately 133 000 pairs of Thick-billed Murres *Uria lomvia* and 63 000 pairs of Northern Fulmars *Fulmarus glacialis*, 10% and 27% of the Canadian populations of each species, respectively. Fulmars from these colonies probably forage as far away as Hudson Strait and the eastern coast of Baffin Island in between (MacLaren Atlantic Ltd. 1978). During spring migration, murres and fulmars use shore leads and polynyas as migration corridors; thus, birds from these large colonies probably stage in Cumberland Sound (Riewe 1992). During August and September, surveys suggest that thousands of seabirds move past the mouth of Cumberland Sound (MacLaren Atlantic Ltd. 1978).

Several thousand Common Eiders *Somateria mollissima borealis* concentrate along the coasts and fjords of Cumberland Sound during August and September (MacLaren Atlantic Inc. 1978), and hundreds of Iceland Gulls *Larus glaucoides* and Dovekies *Alle alle* are found in and around the mouth of the Sound in August. The islands of western Cumberland Sound appear to support the largest breeding concentration of Iceland Gulls in Canada (Riewe 1992; A.J. Gaston, pers. commun.), undoubtedly a nationally significant proportion of the population. Over 1000 Black Guillemots *Cepphus grylle* were surveyed in Cumberland Sound in August 1977 (MacLaren Atlantic Ltd. 1978), representing more than 1% of the Canadian population. Similarly, at least 2000 Black-legged Kittiwakes *Rissa tridactyla* were found in the eastern entrance to Cumberland Sound in August 1977, also representing 1% of the Canadian population. The Sound does not appear to be used heavily by Thick-billed Murres *Uria lomvia*.

Cumberland Sound is an important marine area for a variety of marine mammals, including beluga *Delphinapterus leucas*, narwhal *Monodon monoceros*, walrus *Odobenus rosmarus*, and bowhead whale *Balaena mysticetus* (Stirling and Cleator 1981; Riewe 1992).



Sensitivities: Seabirds are sensitive to disturbance and pollution of their staging and foraging areas.

Potential conflicts: None.

Status: No special status.

References:

MacLaren Atlantic Inc. 1978. Report on aerial surveys 77-2, 77-3, 77-4. Studies of seabird and marine mammals in Davis Strait, Hudson Strait, and Ungava Bay. Vols. 1 and 2. Unpublished report for Imperial Oil Ltd., Aquitaine Co. Ltd., and Canada Cities Services Ltd., Calgary. 127 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Stirling, I.; Cleator, H. (eds.). 1981. Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Location: 64°03'N, 81°50'W

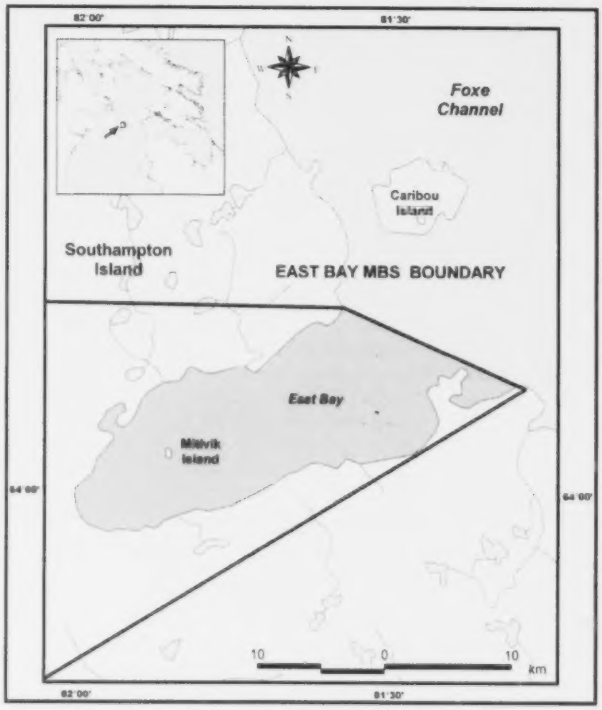
Size: Marine – 274 km^2; terrestrial – 1 km^2

Description: East Bay is a 50-km-long inlet on the southeast part of Southampton Island, about 50 km east of the community of Coral Harbour (Sallit). This area is very flat, and the Bay is quite shallow. It is a key terrestrial site in Nunavut and is described in Alexander et al. (1991).

East Bay lies in the Low Arctic oceanographic zone (Nettleship and Evans 1985), where water flowing south through Foxe Channel meets western Hudson Strait. Ice freeze-up usually occurs by mid-October, although the ice remains unconsolidated. Mobile pack ice dominates western Hudson Strait from January to April, with landfast ice formed around coastlines (Larnder 1968), including East Bay (Gaston et al. 1985). Ice breakup begins in April near persistent shore leads; by May, large patches of open water occur, although the pattern is highly variable among years (Gaston and Hipfner 1998). Pack ice continues to move in and out of East Bay through July (H.G. Gilchrist, pers. commun.).

Biological value: East Bay is a site of intensive international research on eiders (Robertson et al. 2001; Wayland et al. 2001; Bottitta et al. 2002), as it supports Arctic Canada's largest single colony of Common Eiders *Somateria mollissima borealis* and *S. m. sedentaria* on Mitivik Island, varying between 3500 and 5900 pairs (Abraham and Ankney 1986), and more recently estimated at 4500 pairs (H.G. Gilchrist, unpubl. data). Gaston and Cooch (1986) observed several thousand eiders staged in Hudson Strait; recent satellite telemetry work suggests that many of these birds move to East Bay to breed (H.G. Gilchrist, pers. commun.). Most of these birds are of the *borealis* subspecies, and thus this single site represents 1.5% of the Canadian population of this species. Mitivik Island also supports a colony of approximately 200 pairs of Black Guillemots *Cepphus grylle* (H.G. Gilchrist, pers. commun.). A large population of Lesser Snow Geese *Chen caerulescens*, estimated at 2% of the Canadian population (Alexander et al. 1991), breeds at East Bay. Significant numbers of Atlantic Brant *Branta bernicla hrota* (450 nests; Abraham and Ankney 1980) and Sabine's Gull *Xema sabini* (Stenhouse et al. 2001) also breed here. Shorebirds are also numerous, supporting some of the highest breeding densities known for the eastern Arctic (V. Johnston, pers. commun.). Red Phalarope *Phalaropus fulicarius* are the most common shorebirds, occurring in densities of about 30 birds/km^2 and nesting at 8 nests/km^2 (P. Smith, unpubl. data). In 2001, other shorebird densities recorded at East Bay were as follows: Semipalmated Plover *Charadrius semipalmatus* – 5.8/km^2, Black-bellied Plover *Pluvialis squatarola* – 0.4/km^2, Ruddy Turnstone *Arenaria interpres* – 16.25/km^2, Red Knot *Calidris canutus* – 3.3/km^2, and White-rumped Sandpiper *Calidris fuscicollis* – 14.2/km^2 (P. Smith, unpubl. data).

East Bay is also an important site for some marine mammals, notably walrus *Odobenus rosmarus* and beluga *Delphinapterus leucas*. An estimated 350–400 beluga, including calves, and 75 walrus were observed in the waters of East Bay in 2001 (A. Fontaine, pers. obs.). Polar bears



Ursus maritimus commonly move through East Bay to cross Southampton Island and may den in this area (Riewe 1992).

Sensitivities: Colonial marine birds congregate in open ice leads and over key foraging sites. As such, they are susceptible to disturbance and to pollution of their foraging and migration areas.

Potential conflicts: None.

Status: The key marine area of East Bay is protected as a Migratory Bird Sanctuary, and it is a Canadian Important Bird Area (NU023; CEC 1999).

References:

Abraham, K.F.; Ankney, C.D. 1980. Brant research on Southampton Island, NWT: a report of research completed during the summer of 1980. Unpublished report, University of Western Ontario, London. 24 pp.

Abraham, K.F.; Ankney, C.D. 1986. Summer birds of East Bay, Southampton Island, Northwest Territories. Can. Field-Nat. 100:180–185.

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Bottitta, G.; Gilchrist, H.G.; Kift, A. 2002. A pressure-sensitive, wireless device for continuously monitoring nest attendance. Wildl. Soc. Bull. 30:1–6.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Gaston, A.J.; Cooch, F.G. 1986. Observations of common eiders in Hudson Strait: aerial surveys in 1980–1983. Pages 51–54 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Gaston, A.J.; Hipfner, J.M. 1998. The effect of ice conditions in northern Hudson Bay on breeding by thick-billed murres (*Uria lomvia*). Can. J. Zool. 76:480–492.

Gaston, A.J.; Cairns, D.K.; Elliot, R.D.; Noble, D.G. 1985. A natural history of Digges Sound. Can. Wildl. Serv. Occas. Pap. No. 46, Ottawa. 62 pp.

Larnder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Robertson, G.R.; Reed, A.; Gilchrist, H.G. 2001. Clutch, egg, and body variation among Common Eiders, *Somateria mollissima sedentaria*, breeding in Hudson Bay. Polar Res. 20:1–10.

Stenhouse, I.; Gilchrist, H.G.; Montevecchi, W. 2001. Reproductive biology of Sabine's Gulls, *Xema sabini*, on Southampton Island, Canada. Condor 103:98–107.

Wayland, M.; Garcia-Fernandez, A.J.; Neugebauer, E.; Gilchrist, H.G. 2001. Concentrations of cadmium, mercury and selenium in blood, liver, and kidney of common eider ducks from the Canadian Arctic. Environ. Monit. Assess. 71:255–267.

Location: 63°30'N, 72°30'W

Size: Marine – 4015 km^2; terrestrial – 423 km^2

Description: Markham Bay is an island-studded section of southern Baffin Island about midway between the communities of Kimmirut (Lake Harbour) and Cape Dorset (Kinngait). It is located to the east of the former Cape Dorset Migratory Bird Sanctuary and is situated along the northern coast of Hudson Strait.

Markham Bay lies in the Low Arctic oceanographic zone (Nettleship and Evans 1985). Main currents flow east through Hudson Strait (Larnder 1968). Ice freeze-up usually occurs by mid-October, although the ice remains unconsolidated. Mobile pack ice dominates Hudson Strait from January to April, with landfast ice formed around coastlines (Larnder 1968). Ice breakup begins in April near persistent shore leads, such as the lead that opens along southern Baffin Island; by May, large patches of open water occur. Patterns of ice breakup and the location of the floe edge can change considerably among years (McDonald et al. 1997). Little ice remains by late July.

Biological value: This site supports a large portion of the breeding population of Common Eiders *Somateria mollissima borealis* in Hudson Strait. Gaston and Cooch (1986) observed a minimum of 8000 eiders staged off the ice edge between Cape Dorset and Markham Bay in April 1982, when they estimated that 10 000 pairs bred along this section of the island. Between 1997 and 1998, Gilchrist et al. (1998, 1999) surveyed this shoreline by boat and aircraft. Aerial surveys revealed 44 500 eiders (7% of the Canadian population) along this coast, and boat surveys found 8000 nests over 2 years in Markham Bay. This represents nearly 3% of the Canadian population of this subspecies. The eider colonies are typically small and distributed across many islands. They are also susceptible to high annual fluctuations in success due to predation and probably experienced higher use by humans when the settlement of Amadjuak was extant. Markham Bay and area also support substantial numbers of Kumlien's Gull *Larus glaucoides kumlieni* in colonies of 10–200 birds, as well as Black Guillemots *Cepphus grylle* (Riewe 1992).

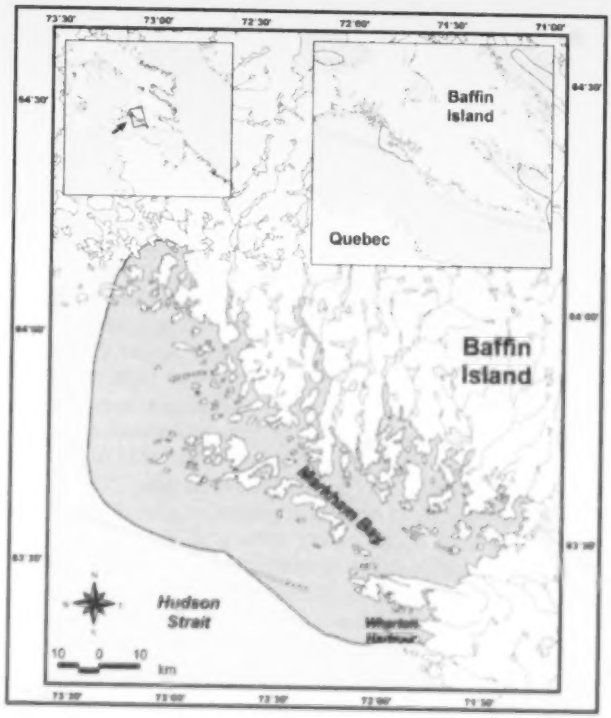
Eiders occur in this area from April through October (MacLaren Marex Ltd. 1979; Gaston and Cooch 1986).

This coast of Baffin Island supports a variety of marine mammals, including beluga *Delphinapterus leucas*, ringed seal *Phoca hispida*, walrus *Odobenus rosmarus*, and polar bear *Ursus maritimus* (Stirling et al. 1980; Riewe 1992).

Sensitivities: Colonial marine birds congregate in open ice leads and over key foraging sites, where they are susceptible to disturbance and to pollution of their foraging and migration areas.

Potential conflicts: None.

Status: No special designation.



References:

Gaston, A.J.; Cooch, F.G. 1986. Observations of common eiders in Hudson Strait: aerial surveys in 1980–1983. Pages 51–54 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Gilchrist, H.G.; Kay, D.; Barrow, B.; Gilliland, S.; Kay, M. 1998. Distribution and abundance of the northern common eider (*Somateria mollissima borealis*) off southern Baffin Island. Unpublished report, Canadian Wildlife Service, Yellowknife. 22 pp.

Gilchrist, H.G.; Kay, D.; Kay, M.; Barrow, B. 1999. Distribution and abundance of the northern common eider (*Somateria mollissima borealis*) off southern Baffin Island, 1999. Unpublished report, Canadian Wildlife Service, Yellowknife. 15 pp.

Larnder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

McDonald, M.; Arragutainaq, L.; Novalinga, Z. 1997. Voices from the Bay. Canadian Arctic Resources Committee, Ottawa. 98 pp.

MacLaren Marex Inc. 1979. Report on aerial surveys of birds and marine mammals in the southern Davis Strait between April and December, 1978. Vol. 1. Birds. Unpublished report for Esso Resources Canada Ltd. and Arctic Petroleum Operators Association, Calgary. 148 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

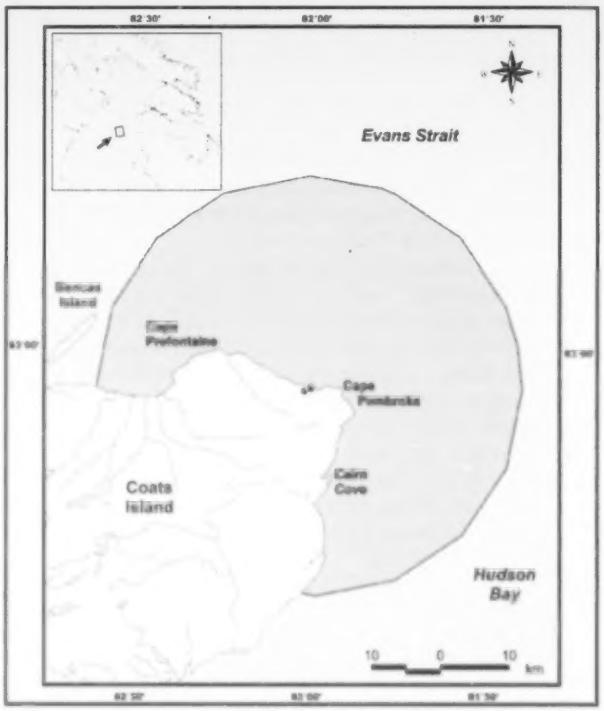
Stirling, I.; Calvert, W.; Andriashek, D. 1980. Population ecology studies of the polar bear in the area of southeastern Baffin Island. Can. Wildl. Serv. Occas. Pap. No. 44, Ottawa. 31 pp.

Location: 62°57'N, 82°00'W

Size: Marine – 1918 km^2; terrestrial – 0 km^2

Description: Coats Island is located in northern Hudson Bay, approximately 100 km south of Coral Harbour on Southampton Island and 110 km west of Mansel Island. The key marine habitat site is centred around Cape Pembroke on the northeast corner of Coats Island. The terrestrial characteristics of Coats Island are described in Alexander et al. (1991) and Heywood and Sanford (1976).

The island is in the Low Arctic oceanographic zone (Nettleship and Evans 1985). Ice freeze-up usually occurs by mid-October, although the ice remains unconsolidated. Mobile pack ice dominates Hudson Strait from January to April, with landfast ice formed around coastlines (Larnder 1968). Some open water often remains between Coats and Southampton islands, and a polynya is located to the west of Southampton Island (Brown and Nettleship 1981). Ice breakup begins in April near persistent shore leads; by May, large patches of open water occur in Hudson Strait. A period of rapid change in ice cover occurs between May and June, when coverage decreases from about 90% to 60% (Gaston and Hipfner 1998). Sea ice conditions vary each year, but landfast ice generally persists around Coats Island into June, and mobile pack ice may persist into July, although open water can be found near the island (Gaston and Hipfner 1998). Waters remain relatively ice-free from late July until October.



Biological value: Coats Island supports two Thick-billed Murre *Uria lomvia* colonies, estimated at 33 000 pairs, or about 2% of the Canadian population (Gaston et al. 1993), situated a few kilometres west of Cape Pembroke (Alexander et al. 1991). These colonies have increased substantially in size from estimates in the 1950s (Tuck 1961; Nettleship 1980; Gaston et al. 1987) and together constitute one of the key seabird research sites in eastern Canada (Gaston and Elliot 1991; Gaston et al. 1993; Donaldson et al. 1997; Gilchrist and Gaston 1997; Gaston and Hipfner 1998; Hipfner et al. 1999). There are also Black Guillemots *Cepphus grylle*, Glaucous Gulls *Larus hyperboreus*, and Peregrine Falcons *Falco peregrinus* on the cliffs at the colonies (Riewe 1992). A large Iceland Gull *Larus glaucoides* colony is situated south of the murre colonies (Gaston and Elliot 1990), and Herring Gulls *Larus argentatus* nest on nearby lakes. Eighty-four species of birds and 13 species of mammals have been recorded in the terrestrial or marine region around Coats Island since 1975 (Gaston and Ouellet 1997). Small numbers of Razorbills *Alca torda* have recently appeared on Coats Island (A.J. Gaston, pers. commun.).

This marine region is used by seabirds from late April through September. Significant concentrations of marine birds may be distributed throughout this region, particularly in August, depending on the annual patterns of ice breakup and the distribution of prey (Gaston et al. 1985). By mid-September, the number of murres in western Hudson Strait has declined sharply.

The waters around Coats Island also support important populations of marine mammals, notably walrus *Odobenus rosmarus*, polar bear *Ursus maritimus*, bowhead whale *Balaena mysticetus*, and beluga *Delphinapterus leucas* (Riewe 1992; Gaston 2000). The area is an important hunting location for the community of Coral Harbour.

Sensitivities: Nesting seabirds are sensitive to disturbance and the pollution of their feeding areas.

Potential conflicts: There is increasing activity by cruise ships in the eastern Arctic (Wakelyn 2001), notably in Hudson Bay, with ships moving through Hudson Strait to Churchill, Manitoba, coming close to Coats and Walrus islands.

Status: Coats Island is an International Biological Programme site (Region 9, Site No. 6-3; Nettleship 1980) and an Important Bird Area (NU005; CEC 1999). In 2002, the community of Coral Harbour contacted CWS to initiate discussions about creating a national wildlife area on Coats Island.

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Brown, R.G.B.; Nettleship, D.N. 1981. The biological significance of polynyas to arctic colonial seabirds. Pages 56–66 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Donaldson, G.M.; Gaston, A.J.; Chardine, J.W.; Kampp, K.; Nettleship, D.N.; Elliot, R.D. 1997. Winter distributions of thick-billed murres from the eastern Canadian Arctic and western Greenland in relation to age and time of year. Can. Wildl. Serv. Occas. Pap. No. 96, Ottawa.

Gaston, A.J. 2000. Occurrence of beluga, *Delphinapterus leucas*, in summer off northeastern Coats Island, Northwest Territories. Can. Field-Nat. 114:236–240.

Gaston, A.J.; Elliot, R.D. 1990. Kumlien's gull, *Larus glaucoides kumlieni*, on Coats Island, Northwest Territories. Can. Field-Nat. 104:477–479.

Gaston, A.J.; Elliot, R.D. 1991. Studies of high-latitude seabirds. 2. Conservation biology of Thick-billed Murres in the Northwest Atlantic. Can. Wildl. Serv. Occas. Pap. No. 69, Ottawa.

Gaston, A.J.; Hipfner, J.M. 1998. The effect of ice conditions in northern Hudson Bay on breeding by thick-billed murres (*Uria lomvia*). Can. J. Zool. 76:480–492.

Gaston, A.J.; Ouellet, H. 1997. Birds and mammals of Coats Island, N.W.T. Arctic 50:101–118.

Gaston, A.J.; Cairns, D.K.; Elliot, R.D.; Noble, D.G. 1985. A natural history of Digges Sound. Can. Wildl. Serv. Occas. Pap. No. 46, Ottawa. 62 pp.

Gaston, A.J.; Elliot, R.D.; Noble, D.G. 1987. Studies of thick-billed murres on Coats Island, Northwest Territories, in 1981, 1984, 1985, and 1986. Can. Wildl. Serv. Prog. Notes No. 167, Ottawa. 13 pp.

Gaston, A.J.; de Forest, L.N.; Gilchrist, H.G.; Nettleship, D.N. 1993. Monitoring Thick-billed Murre populations at colonies in northern Hudson Bay, 1972–92. Can. Wildl. Serv. Occas. Pap. No. 80, Ottawa. 16 pp.

Gilchrist, H.G.; Gaston, A.J. 1997. Effects of murre nest site characteristics and wind conditions on predation by glaucous gulls. Can. J. Zool. 75:518–524.

Heywood, W.W.; Sanford, B.V. 1976. Geology of Southampton, Coats, and Mansel islands, District of Keewatin, NWT. Memoir 382, Geological Survey of Canada, Ottawa. 35 pp.

Hipfner, J.M.; Gaston, A.J.; Martin, D.L.; Jones, I.L. 1999. Seasonal declines in replacement egg-layings in a long-lived, Arctic seabird: costs of late breeding or variation in female quality? J. Anim. Ecol. 68:988–998.

Larnder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Tuck, L.M. 1961. The murres — their distribution, populations and biology, a study of the genus *Uria*. Can. Wildl. Serv. Monogr. No. 1, Ottawa. 260 pp.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

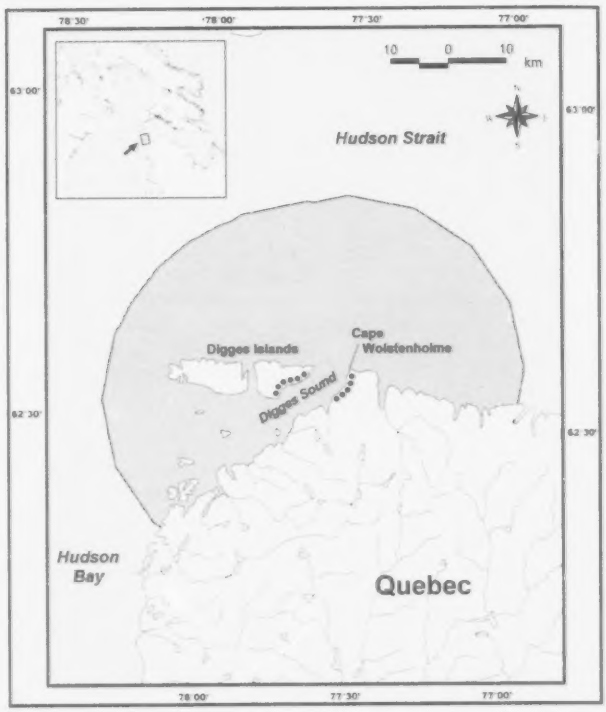
27 – Digges Sound

Location: 62°33'N, 77°35'W

Size: Marine – 2207 km^2; terrestrial – 102 km^2

Description: Digges Sound is located at the northeastern corner of Hudson Bay where it meets Hudson Strait. It is enclosed by the Digges Islands to the northwest, Cape Wolstenholme to the northeast, and the mainland of Ungava Peninsula, Quebec, to the south. The site is approximately 17 km north of the community of Ivujivik. A detailed description of the Digges Sound terrestrial environment and key terrestrial habitat sites (Alexander et al. 1991) is provided in Gaston et al. (1985).

Hudson Strait is situated in the Low Arctic oceanographic zone (Nettleship and Evans 1985). Main water currents flow north from southern Hudson Bay and east through Hudson Strait (McDonald et al. 1997). Ice freeze-up usually occurs by mid-October, although the ice remains unconsolidated. Mobile pack ice dominates Hudson Strait from January to April, with landfast ice formed around coastlines (Larnder 1968). There are some polynyas around the islands in Digges Sound, and the position of the floe edge can vary greatly by year (McDonald et al. 1997). Ice breakup begins in April near persistent shore leads; by May, large patches of open water occur near Digges Sound. Rapid changes occur in ice between May and June (Gaston and Hipfner 1998), but ice conditions are consistent from year to year in the second half of June (Gaston et al. 1985). Waters remain relatively ice-free from late July until October.



Biological value: Collectively, the two colonies of Thick-billed Murres *Uria lomvia* in Digges Sound represent approximately 300 000 pairs, or 20% of the Canadian population (Gaston et al. 1985). The larger colony occurs on eastern Digges Island, while the smaller colony is found southwest of Cape Wolstenholme on the mainland. This is one of the largest concentrations of Thick-billed Murres in Canada (Nettleship 1980; Gaston and Hipfner 2000), although recent numbers are substantially smaller than those estimated by Tuck in 1955 (Tuck 1961; Gaston et al. 1993). Approximately 870 pairs of Black Guillemots *Cepphus grylle*, 170 pairs of Glaucous Gulls *Larus hyperboreus*, 350 pairs of Iceland Gulls *L. glaucoides*, 30 pairs of Herring Gulls *L. argentatus*, and 100 pairs of Arctic Terns *Sterna paradisaea* also breed here (Gaston et al. 1985). A small colony of Atlantic Puffins *Fratercula arctica* occurs on Dome Island, south of western Digges Island, and Razorbills *Alca torda* have been sighted in the area, but no evidence of breeding has yet been found (Gaston and Mallone 1980).

Significant concentrations of marine birds may be distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (Gaston et al. 1985). This marine region is occupied by seabirds from late April through September (Gaston et al. 1985). A key period occurs in August, when birds are departing the colony with their young on a swimming migration through Hudson Strait to the offshore areas of Newfoundland and Labrador (Gaston and Elliot 1991). In early September 1980, chicks were concentrated in an area about 140 km north and west of Digges Sound. At least 40 000 chicks were present, and at least 140 000 adults were scattered east of 72°W (Gaston 1982). The birds remain in offshore areas, presumably where the easterly current is strongest. By mid-September, the number of murres in western Hudson Strait has declined sharply.

The Digges Sound area also supports several pairs of nesting Gyrfalcons *Falco rusticolus* (Gaston et al. 1985).

The waters around Digges Sound also support populations of marine mammals, notably beluga *Delphinapterus leucas*, bearded seal *Erignathus barbatus*, and ringed seal *Phoca hispida* (Gaston et al. 1985). The area also supports some polar bear *Ursus maritimus* (Riewe 1992). The area is an important hunting location for the community of Ivujivik. In particular, some community members regularly harvest murre eggs at the Digges Sound colonies (Gaston et al. 1985).

Sensitivities: Nesting seabirds are sensitive to disturbance and the pollution of their feeding areas.

Potential conflicts: There is increasing activity by cruise ships in the eastern Arctic (Wakelyn 2001), notably in Hudson Bay, with ships moving through Hudson Strait to Churchill, Manitoba. These colonies are some of the most disturbed by humans in the Canadian Arctic (Chardine and Mendenhall 1998).

Status: Digges Sound is an International Biological Programme site (Region 9, Site No. 6-7; Nettleship 1980) and an Important Bird Area in Canada (NU001; CEC 1999). The Quebec provincial government has begun work to set up a provincial park at Cape Wolstenholme, containing the mainland murre colony (S. Cossette, pers. commun.).

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Chardine, J.; Mendenhall, V. 1998. Human disturbance at arctic seabird colonies. Circumpolar Seabird Working Group Technical Report No. 2, Conservation of Arctic Flora and Fauna, Akureyri, Iceland.

Gaston, A.J. 1982. Migration of juvenile Thick-billed Murres through Hudson Strait in 1980. Can. Field-Nat. 96:30–34.

Gaston, A.J.; Elliot, R.D. 1991. Studies of high-latitude seabirds. 2. Conservation biology of Thick-billed Murres in the Northwest Atlantic. Can. Wildl. Serv. Occas. Pap. No. 69, Ottawa. 63 pp.

Gaston, A.J.; Hipfner, J.M. 1998. The effect of ice conditions in northern Hudson Bay on breeding by thick-billed murres (*Uria lomvia*). Can. J. Zool. 76:480–492.

Gaston, A.J.; Hipfner, J.M. 2000. Thick-billed Murre (*Uria lomvia*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 497. The Birds of North America Inc., Philadelphia.

Gaston, A.J.; Mallone, M. 1980. Range extension of Atlantic puffin and razorbill in Hudson Strait. Can. Field-Nat. 94:328–329.

Gaston, A.J.; Cairns, D.K.; Elliot, R.D.; Noble, D.G. 1985. A natural history of Digges Sound. Can. Wildl. Serv. Occas. Pap. No. 46, Ottawa. 62 pp.

Gaston, A.J.; de Forest, L.N.; Gilchrist, H.G.; Nettleship, D.N. 1993. Monitoring thick-billed murre populations at colonies in northern Hudson Bay, 1972–92. Can. Wildl. Serv. Occas. Pap. No. 80, Ottawa. 16 pp.

Larnder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

McDonald, M.; Arragutainaq, L.; Novalinga, Z. 1997. Voices from the Bay. Canadian Arctic Resources Committee, Ottawa. 98 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Tuck, L.M. 1961. The murres — their distribution, populations and biology, a study of the genus *Uria*. Can. Wildl. Serv. Monogr. No. 1, Ottawa. 260 pp.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

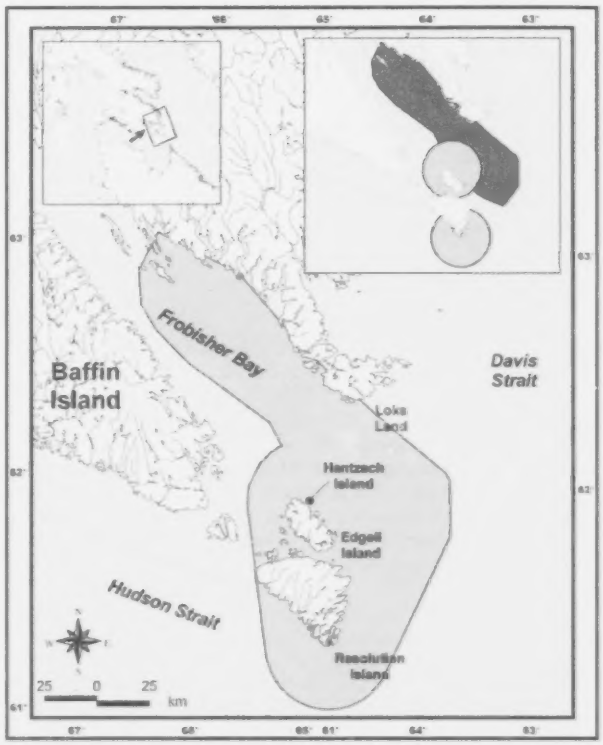
28 – Frobisher Bay

Location: 62°30'N, 65°00'W

Size: Marine – 12 442 km^2; terrestrial – 1336 km^2

Description: Frobisher Bay is a relatively shallow bay running approximately 200 km northwest to southeast in southern Baffin Island, just north of Hudson Strait. A large polynya forms here annually (Stirling and Cleator 1981), its size and shape varying according to ice and wind conditions. Islands are numerous, particularly along the north side of the Bay and extending through to Loks Land and Resolution Island. Many small polynyas are found among these islands. A key terrestrial habitat site, Hantzsch Island, occurs here. This is a small, dome-shaped island located approximately 1 km off the northeastern shore of Edgell Island, at the mouth of Frobisher Bay (Alexander et al. 1991).

Frobisher Bay is in the Low Arctic oceanographic zone (Nettleship and Evans 1985). It exhibits the second highest tides in Canada (regularly over 10 m). Ice freeze-up usually begins in late October or early November, but the timing varies greatly among years. The edge of the polynya may be 20–100 km southeast from the city of Iqaluit (Mallory, pers. obs.). Ice breakup begins in April near open water, and the entire Bay is usually navigable by early July, although large pans of ice may persist into late July.



Biological value: Significant concentrations of marine birds are distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (MacLaren Atlantic Ltd. 1978; Riewe 1992). A colony of Thick-billed Murres *Uria lomvia* occurs on Hantzsch Island (Alexander et al. 1991), estimated at 50 000 pairs (Nettleship 1980), which represents approximately 3% of the Canadian population; the colony was last visited in 1982. About 5000 pairs of Black-legged Kittiwakes *Rissa tridactyla* (1% of the Canadian population) breed here (Gaston 1986, 1991), with large numbers around Resolution and Edgell islands in August 1977 (MacLaren Atlantic Ltd. 1978). Moreover, almost 9000 kittiwakes were concentrated in the coastal habitats of the Hall Peninsula in late August 1978 (MacLaren Marex Inc. 1979). Glaucous Gulls *Larus hyperboreus* and possibly Northern Fulmars *Fulmarus glacialis* also breed on Hantzsch Island (Gaston 1991). At least 2000 fulmars were in open water around Edgell and Resolution islands in June 1977, with several thousand more staged off the ice edge in Davis Strait (MacLaren Atlantic Ltd. 1978). These numbers grew by August, especially off Resolution Island. Nearby Loks Land is thought to support Nunavut's largest known colony of Razorbills *Alca torda*, although the colony has not been visited since 1953 (Brown et al. 1975). Atlantic Puffins *Fratercula arctica* might occur here (Nettleship 1980), and hundreds of Dovekies *Alle alle* congregate off the Hall Peninsula in August (MacLaren Atlantic Ltd. 1978). Many Black Guillemots *Cepphus grylle* breed in Frobisher Bay, although a comprehensive census has not been conducted. Mallory (unpubl. data) counted 1127 guillemots around 17 islands in the Bay in 2001, and many were observed on a survey along the north shore in 2000 (Fontaine et al. 2001). Thousands were found around the Bay in 1977 (MacLaren Atlantic Ltd. 1978). Frobisher Bay is also an important nesting, feeding, and migration stopover for Common Eiders *Somateria mollissima borealis* (Abraham and Finney 1986). Over 1000 eiders were observed in a shoreline survey in 2000 (Fontaine et al. 2001), and more than 2000 nest cups were counted on islands in 2001 (Mallory, unpubl. data). Common Eiders begin to arrive in this area in late April (F. Merkel, unpubl. data). Many thousands of eiders and Iceland Gulls *Larus glaucoides* were observed around Resolution Island, Loks Land, and the tips of the Meta Incognita and Hall peninsulas in 1977 (MacLaren Atlantic Ltd. 1978). Groups of more than 100 Ivory Gulls *Pagophila eburnea*, a species at risk in Canada, have been observed in this vicinity (MacLaren Marex Inc. 1979). Harlequin Ducks *Histrionicus histrionicus*, another species at risk, occur in Frobisher Bay in unknown numbers (Mallory et al. 2001). Many other species, including Canada Geese *Branta canadensis*, Long-tailed Ducks *Clangula hyemalis*, and various gulls (*Larus* spp.), are common in Frobisher Bay, but their population size and distribution have not been assessed. Traditional Inuit ecological knowledge suggests that the mouth of Frobisher Bay is an important feeding, staging, and breeding area for over 15 species of marine birds (Riewe 1992).

Seabirds occur in this marine area with highest concentrations from early May to October, although migrating marine birds and seaducks may be found in open water areas earlier or later in the season (Riewe 1992). An important feeding and staging area is the zone south of Resolution Island. A variety of marine birds overwinter here in small numbers, including Black Guillemots (Brown and Nettleship 1981), eiders, and Glaucous Gulls (Riewe 1992). Given that Hantzsch Island has not been visited in 20 years and that a diversity of marine birds breed in this area (notably

Razorbills, which may be increasing in Nunavut; G. Robertson, pers. commun.), a resurvey of marine birds near the mouth of Frobisher Bay should be considered a priority.

This marine area is also important for many marine mammals, including bearded seal *Erignathus barbatus*, ringed seal *Phoca hispida*, harp seal *Phoca groenlandica*, walrus *Odobenus rosmarus*, and beluga *Delphinapterus leucas* (Riewe 1992). This is a key wintering area for the beluga (MacLaren Marex Inc. 1979). Bottlenose whales *Hyperoodon ampullatus* regularly occupy the area in spring and summer (Stirling and Cleator 1981). Polar bears *Ursus maritimus* are common in this area and use the nearby Meta Incognita Peninsula as a maternity denning area (Stirling et al. 1980).

Sensitivities: Nesting seabirds are sensitive to disturbance and the pollution of their feeding areas.

Potential conflicts: Davis Strait has the potential to become a marine shipping route and an area of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979). The complex nature of currents in the region suggests that oil spills in southern Davis Strait could enter this marine area (Barry 1977). Increased ship traffic attributable to the needs of the growing community of Iqaluit could contribute to higher disturbance of birds, as well as increased chance of pollution.

Status: Hantzsch Island is an International Biological Programme site (Region 9, Site No. 7-10; Nettleship 1980) and a Canadian Important Bird Area (NU025; CEC 1999).

References:

Abraham, K.F.; Finney, G.H. 1986. Eiders of the eastern Canadian Arctic. Pages 55–73 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Barry, R.G. 1977. The coastal environment of southern Baffin Island and northern Labrador – Ungava. Final report to Imperial Oil. APOA Project No. 138, Arctic Petroleum Operators Association, Calgary.

Brown, R.G.B.; Nettleship, D.N. 1981. The biological significance of polynyas to arctic colonial seabirds. Pages 56–66 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Brown, R.G.B.; Nettleship, D.N.; Germain, P.; Tull, C.E.; Davis, T. 1975. Atlas of eastern Canadian seabirds Canadian Wildlife Service, Ottawa. 220 pp.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 389 pp. (see also www.ibacanada.com).

Fontaine, A.J.; Mallory, M.L.; Gilchrist, H.G; Akearok, J. 2001. Coastal survey of eiders and other marine birds along the Hall Peninsula, southeast Baffin Island, Nunavut. Can. Wildl. Serv. Tech. Rep. No. 366. 28 pp.

Gaston, A.J. 1986. Timing of breeding of kittiwakes *Rissa tridactyla* and growth and diet of the chicks at Hantzsch Island, NWT, Canada. Seabird 11:3–11.

Gaston, A.J. 1991. Seabirds of Hudson Bay, Hudson Strait and adjacent waters. Pages 7–16 *in* J.P. Croxall (ed.), Seabird status and conservation: a supplement. Internatonal Council on Bird Preservation Technical Report No. 11, Cimbridge, U.K.

Imperial Oil Ltd. 1978. Environmental impact statement for exploratory drilling in Davis Strait region. Unpublished report, Imperial Oil Ltd., Aquitaine Co. Canada Ltd., and Canada Cities Services Ltd. 31 pp.

MacLaren Atlantic Ltd. 1978. Appendix A — Seabird distribution maps. Unpublished report for Imperial Oil Ltd., Aquitaine Co. of Canada Ltd., and Arctic Petroleum Operators Association, Dartmouth. 172 pp.

MacLaren Marex Inc. 1979. Report on aerial surveys of birds and marine mammals in the southern Davis Strait between April and December, 1978. Vol. 1. Birds. Unpublished report for Esso Resources Canada Ltd. and Arctic Petroleum Operators Association, Calgary. 148 pp.

Mallory, M.L.; Akearok, J.; Fontaine, A.J. 2001. Community knowledge on the distribution and abundance of species at risk in southern Baffin Island, Nunavut, Canada. Can. Wildl. Serv. Tech. Rep. No. 363. 68 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Petro-Canada Ltd. 1979. Initial environmental assessment. Proposed Baffin Bay exploratory drilling program. Unpublished report, Petro-Canada Ltd., Calgary. 414 pp.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Stirling, I.; Cleator, H. (eds.). 1981. Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Stirling, I.; Calvert, W.; Andriashek, D. 1980. Population ecology studies of the polar bear in the area of southeastern Baffin Island. Can. Wildl. Serv. Occas. Pap. No. 44, Ottawa. 31 pp.

29 – Button Islands

Location: 60°30'N, 64°30'W

Size: Marine – 3909 km^2; terrestrial – 81 km^2

Description: The Button Islands are a small series of islands 10 km north of the Torngat Peninsula of northern Labrador, at the eastern entrance to Hudson Strait, in a direct line towards Resolution Island. Islands in this region are part of Nunavut.

These islands lie in the Low Arctic oceanographic zone (Nettleship and Evans 1985), where easterly currents from Hudson Strait meet the southerly flowing Labrador Current. Ice freeze-up usually occurs by mid-October, although the ice remains unconsolidated. Mobile pack ice dominates Hudson Strait from January to April, with landfast ice formed along coastlines (Larnder 1968). Ice breakup begins in April near persistent shore leads; by May, large patches of open water occur. Little ice remains by late July.

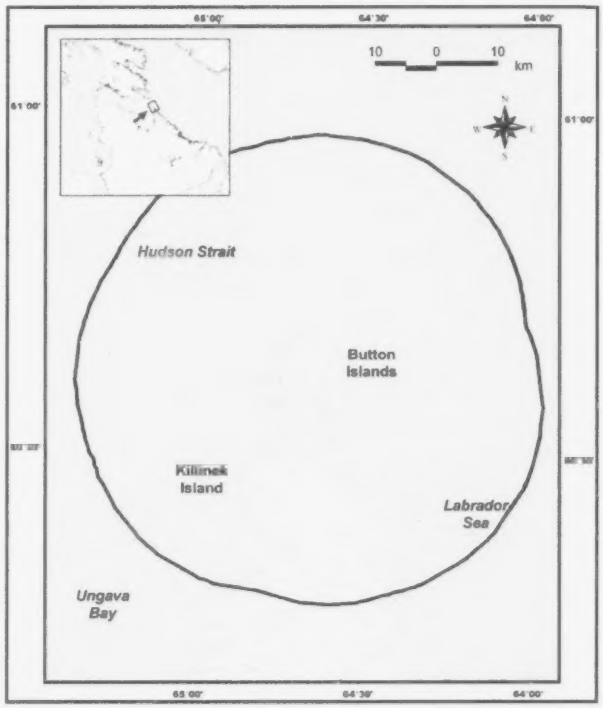
Biological value: Surveys in 1977 and 1978 found many seabirds in the vicinity of the Button Islands (MacLaren Marex Inc. 1979). Thousands of Northern Fulmars *Fulmarus glacialis* forage near the Button Islands in August and September, perhaps in sufficient numbers to represent 1% of the Canadian population (6000 birds; MacLaren Atlantic Ltd. 1978). Several hundred Black-legged Kittiwakes *Rissa tridactyla* also feed in the area at this time. Flocks of Ivory Gulls *Pagophila eburnea* have been spotted in this area during spring migration (MacLaren Marex Inc. 1979). Over 300 Common Eiders *Somateria mollissima borealis* were observed here in late March 1978 (MacLaren Marex Inc. 1979), and this region supports a local breeding population of unknown size (Gross 1937). Most notably, over 900 000 pairs of Thick-billed Murres *Uria lomvia* breed in four colonies around Hudson Strait (Gaston and Hipfner 2000), and most of these undergo a swimming migration through Hudson Strait and south along the Labrador coast to winter off Newfoundland (Gaston 1982; Gaston and Elliot 1991). It is quite likely that more than 1% (perhaps as much as 10%) of the Canadian population of Thick-billed Murres migrates through the waters near the Button Islands in September.

Walrus *Odobenus rosmarus*, beluga *Delphinapterus leucas*, and polar bear *Ursus maritimus* all inhabit this region (MacLaren Marex Inc. 1979).

Sensitivities: Seabirds are sensitive to disturbance and to the pollution of offshore waters used as foraging, staging, and migration routes.

Potential conflicts: Davis Strait has the potential to become a marine shipping route and an area of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979). The complex nature of currents in the region suggests that oil spills in southern Davis Strait could enter the Button Islands marine area (Barry 1977). Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: The Button Islands are an International Biological Programme site (Region 9, Site No. 6-8; Eng et al. 1989).



References:

Barry, R.G. 1977. The coastal environment of southern Baffin Island and northern Labrador – Ungava. Final report to Imperial Oil. APOA Project No. 138, Arctic Petroleum Operators Association, Calgary.

Eng, M.; Green, J.; Little, L.; Auchterlonie, S. 1989. A review of International Biological Programme sites in the Northwest Territories. Unpublished report, International Biological Programme Working Group, Yellowknife.

Gaston, A.J. 1982. Migration of juvenile Thick-billed Murres through Hudson Strait in 1980. Can. Field-Nat. 96:30–34.

Gaston, A.J.; Elliot, R.D. 1991. Studies of high-latitude seabirds. 2. Conservation biology of Thick-billed Murres in the Northwest Atlantic. Can. Wildl. Serv. Occas. Pap. No. 69, Ottawa. 63 pp.

Gaston, A.J.; Hipfner, J.M. 2000. Thick-billed Murre (*Uria lomvia*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 497. The Birds of North America Inc., Philadelphia.

Gross, A.O. 1937. Birds of the Bowdoin-Macmillan Arctic expedition. Auk 54:12–42.

Imperial Oil Ltd. 1978. Environmental impact statement for exploratory drilling in Davis Strait region. Unpublished report, Imperial Oil Ltd., Aquitaine Co. Canada Ltd., and Canada Cities Services Ltd. 31 pp.

Larnder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

MacLaren Atlantic Inc. 1978. Report on aerial surveys 77-2, 77-3, 77-4. Studies of seabird and marine mammals in Davis Strait, Hudson Strait, and Ungava Bay. Vols. 1 and 2. Unpublished report for Imperial Oil Ltd., Aquitaine Co. Ltd., and Canada Cities Services Ltd., Calgary. 127 pp.

MacLaren Marex Inc. 1979. Report on aerial surveys of birds and marine mammals in the southern Davis Strait between April and December, 1978. Vol. 1. Birds. Unpublished report for Esso Resources Canada Ltd. and Arctic Petroleum Operators Association, Calgary. 148 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Petro-Canada Ltd. 1979. Initial environmental assessment. Proposed Baffin Bay exploratory drilling program. Unpublished report, Petro-Canada Ltd., Calgary. 414 pp.

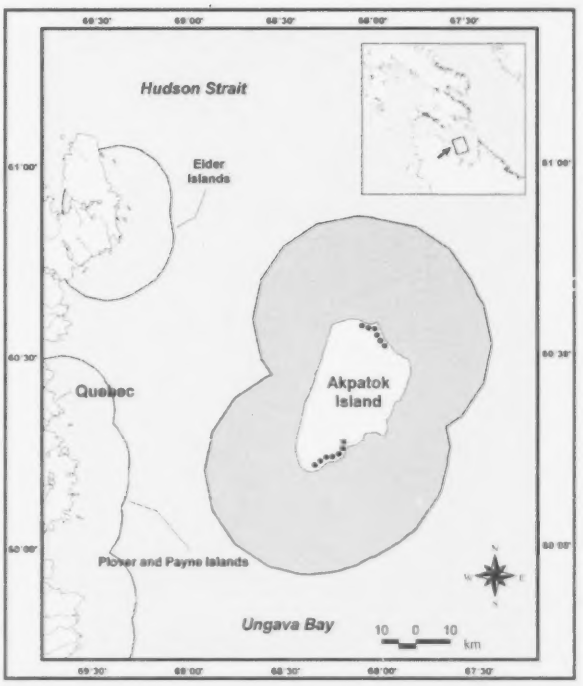
30 – Akpatok Island

Location: 60°25'N, 68°08'W

Size: Marine – 4943 km^2; terrestrial – 859 km^2

Description: Akpatok Island is located in northwestern Ungava Bay, about 65 km offshore from the northern mainland of Quebec (Nunavik). It is a flat-topped island surrounded by cliffs 245 m high and lies near the eastern entrance to Hudson Strait. The physical characteristics of the island are described in Chapdelaine et al. (1986) and Alexander et al. (1991).

Hudson Strait lies in the Low Arctic oceanographic zone (Nettleship and Evans 1985). Ice freeze-up usually occurs by mid-October, although the ice remains unconsolidated. Mobile pack ice dominates Hudson Strait from January to April, with landfast ice formed around coastlines (Larnder 1968). Ice breakup begins in April near persistent shore leads; by May, large patches of open water occur. Little ice remains by late July.



Biological value: Two large colonies of Thick-billed Murres *Uria lomvia* occur on Akpatok Island (Tuck 1960) — a northern colony spread along 14 km of cliff face and a southern colony distributed over 15 km. Collectively, these colonies are estimated at approximately 520 000 pairs (Gaston 1991), with the northern colony slightly larger (Alexander et al. 1991). This means that the island supports the largest number of breeding Thick-billed Murres in Canada, at more than 20% of the Canadian population (Gaston and Hipfner 2000). Murres arrive at waters around the island in early May and depart on a swimming migration with their young at the end of August. Tuck and Squires (1955) suggested that most murres from Akpatok Island fed within 16 km of the colony, although this small foraging range appears exceptional (Gaston and Nettleship 1981). Approximately 300–500 pairs of Black Guillemots *Cepphus grylle* nest along the island's coast, and Peregrine Falcons *Falco peregrinus*, Gyrfalcons *Falco rusticolus*, and Glaucous Gulls *Larus hyperboreus* also breed here (Alexander et al. 1991). Significant concentrations of marine birds may be distributed throughout this region, depending on the annual patterns of ice breakup and the distribution of prey (MacLaren Atlantic Ltd. 1978; Riewe 1992).

The marine area around Akpatok Island is important for many marine mammals, especially walrus *Odobenus rosmarus*, ringed seal *Phoca hispida*, and polar bear *Ursus maritimus* (Smith et al. 1975). Akpatok Island is a traditional hunting ground for these species for nearby Inuit communities (Hentzel 1992).

Sensitivities: Nesting seabirds are sensitive to disturbance and the pollution of their feeding areas. The shoreline area around Akpatok Island is considered as being at a "high hazard risk" for oil spills (Barry 1977).

Potential conflicts: Davis Strait has the potential to become a marine shipping route and an area of hydrocarbon exploration and development (Imperial Oil Ltd. 1978; Petro-Canada Ltd. 1979). The complex nature of currents in the region suggests that oil spills in southern Davis Strait could enter the Akpatok Island marine area (Barry 1977). Increased tourism (particularly from cruise ships; Wakelyn 2001) and associated disturbance to murre colonies (Hentzel 1992) also pose threats. Oil spills associated with drilling or shipping activities could endanger large numbers of seabirds and pollute their feeding areas.

Status: Akpatok Island is an International Biological Programme site (Region 9, Site No. 6-6; Nettleship 1980) and an Important Bird Area in Canada (NU007; CEC 1999). Nearby communities were contacted in the early 1990s about protection, but discussions and actions are postponed until the settlement of Makivak Land Claim negotiations.

References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Barry, R.G. 1977. The coastal environment of southern Baffin Island and northern Labrador - Ungava. Final report to Imperial Oil. APOA Project No. 138, Arctic Petroleum Operators Association, Calgary.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Chapdelaine, G.; Gaston, A.J.; Brousseau, P. 1986. Censusing the Thick-billed Murre colonies of Akpatok Island, NWT. Can. Wildl. Serv. Prog. Notes No. 163, Ottawa. 9 pp.

Gaston, A.J. 1991. Seabirds of Hudson Bay, Hudson Strait and adjacent waters. Pages 7–16 *in* J.P. Croxall (ed.), Seabird status and conservation: a supplement. International Council on Bird Preservation Technical Report No. 11, Cambridge, U.K.

Gaston, A.J.; Hipfner, J.M. 2000. Thick-billed Murre (*Uria lomvia*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 497. The Birds of North America Inc., Philadelphia.

Gaston, A.J.; Nettleship, D.N. 1981. The thick-billed murres of Prince Leopold Island. Can. Wildl. Serv. Monogr. No. 6. 350 pp.

Hentzel, I.R. 1992. Akpatok Island revisited. Environ. Conserv. 19:361–363.

Imperial Oil Ltd. 1978. Environmental impact statement for exploratory drilling in Davis Strait region. Unpublished report, Imperial Oil Ltd., Aquitaine Co. Canada Ltd., and Canada Cities Services Ltd. 31 pp.

Larnder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

MacLaren Atlantic Ltd. 1978. Appendix A — Seabird distribution maps. Unpublished report for Imperial Oil Ltd., Aquitaine Co. of Canada Ltd., and Arctic Petroleum Operators Association, Dartmouth. 172 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Petro-Canada Ltd. 1979. Initial environmental assessment. Proposed Baffin Bay exploratory drilling program. Unpublished report, Petro-Canada Ltd., Calgary. 414 pp.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Smith, P.A.; Stirling, I.; Jonkel, C.; Juniper, I. 1975. Notes on the present status of the polar bear (*Ursus maritimus*) in Ungava Bay and northern Labrador. Can. Wildl. Serv. Prog. Notes No. 53, Ottawa. 8 pp.

Tuck, L.M. 1960. The murres: their distribution, populations, and biology. A study of the genus *Uria*. Can. Wildl. Serv. Monogr. No. 1, Ottawa.

Tuck, L.M.; Squires, H.J. 1955. Food and feeding habits of Brunnich's Murre (*Uria lomvia lomvia*) on Akpatok Island. J. Fish. Res. Board Can. 12:781–792.

Wakelyn, L. 2001. Implications for ship-based tourism for CWS protected areas and other key migratory bird habitat sites in the Northwest Territories and Nunavut. Unpublished report, Canadian Wildlife Service, Yellowknife.

31 – Ungava Bay Archipelagoes

Location: 60°10'N, 69°30'W

Size: Marine – 5624 km^2; terrestrial – 5 km^2

Description: Ungava Bay is a large bay in Nunavik, northern Quebec, which is rimmed with countless islands. Several Inuit communities are located here, including Quaqtaq, Kangirsuk, and Kuujjuaq. Although in the Nunavik area, all offshore islands in Ungava Bay are part of Nunavut. A description of the terrestrial characteristics can be found in Alexander et al. (1991).

Ungava Bay lies in the Low Arctic oceanographic zone (Nettleship and Evans 1985). Main currents flow east through Hudson Strait (Larnder 1968). Ice freeze-up usually occurs by mid-October, although the ice remains unconsolidated. Mobile pack ice dominates Hudson Strait from January to April, with landfast ice formed around coastlines (Larnder 1968). Ice breakup begins in April near persistent shore leads, such as the one that opens along southern Baffin Island; by May, large patches of open water occur. Patterns of ice breakup can change considerably among years (Nakashima 1986), but eiders have begun to select nest sites by early June. Little ice remains by late July.

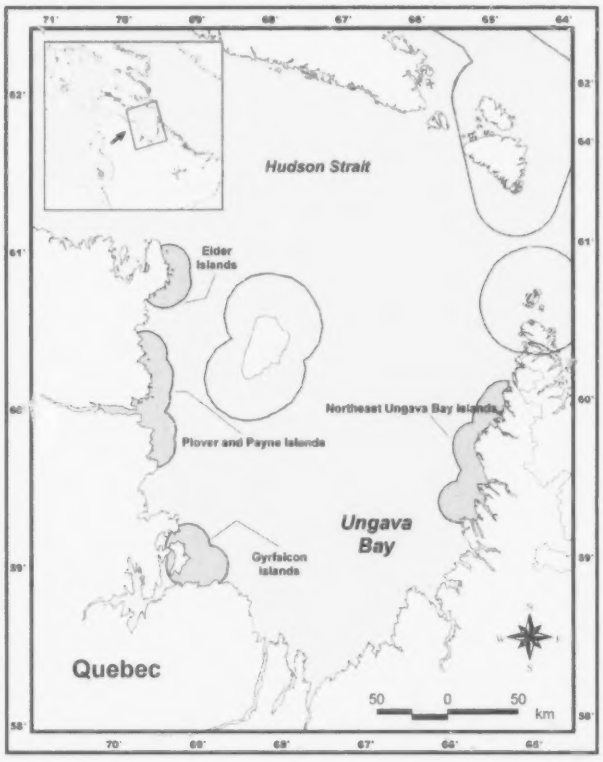
Biological value: This site supports a large portion of the breeding population of Common Eiders *Somateria mollissima borealis* in Hudson Strait. In 1977, thousands of eiders were observed among the islands of the western shore of Ungava Bay (MacLaren Atlantic Ltd. 1978). Prenesting aggregations occur off the Plover and Gyrfalcon islands, as migrating birds move westerly along the Ungava coast (Nakashima 1986). Key nesting sites occur at the Eider Islands, the Plover and Payne islands, the Gyrfalcon Islands, and islands of northeastern Ungava Bay. These represent 4100 nesting pairs, 3500 pairs, 3600 pairs, and 6700 pairs, respectively. Each site represents more than 1% of the Canadian population of this subspecies, and collectively these 17 900 pairs represent 6%. However, many smaller eider colonies are scattered across the islands in the archipelagoes and collectively represent about 48 000 nests, or 16% of the population (Chapdelaine et al. 1986). Eiders occur in this area from April through October (Gaston and Cooch 1986).

This coast of Ungava Bay supports a variety of marine mammals, including beluga *Delphinapterus leucas*, ringed seal *Phoca hispida*, walrus *Odobenus rosmarus*, and polar bear *Ursus maritimus* (Riewe 1992).

Sensitivities: Colonial marine birds congregate in open ice leads and over key foraging sites. As such, they are susceptible to disturbance and to pollution of their foraging and migration areas.

Potential conflicts: In this region, Inuit from nearby communities gather a large number of eggs and a substantial amount of down, but harvest levels are thought to have negligible impacts on the population (Reed 1986).

Status: The Plover and Payne, Gyrfalcon, and northeastern Ungava Bay islands are Canadian Important Bird Areas (NU027, NU028, NU029; CEC 1999).



References:

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Chapdelaine, G.; Bourget, A.; Kemp, W.B.; Nakashima, D.J.; Murray, D.J. 1986. Population d'Eider à duvet près des côtes du Québec septentrional. Pages 39–50 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Gaston, A.J.; Cooch, F.G. 1986. Observations of common eiders in Hudson Strait: aerial surveys in 1980–1983. Pages 51–54 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Larnder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

MacLaren Atlantic Inc. 1978. Report on aerial surveys 77-2, 77-3, 77-4. Studies of seabird and marine mammals in Davis Strait, Hudson Strait, and Ungava Bay. Vols. 1 and 2. Unpublished report for Imperial Oil Ltd., Aquitaine Co. Ltd., and Canada Cities Services Ltd., Calgary. 127 pp.

Nakashima, D.J. 1986. Inuit knowledge of the ecology of the common eider in northern Quebec. Pages 102–113 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Reed, A. 1986. Eiderdown harvesting and other uses of common eiders in spring and summer. Pages 138–146 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

32 – Sleeper Islands

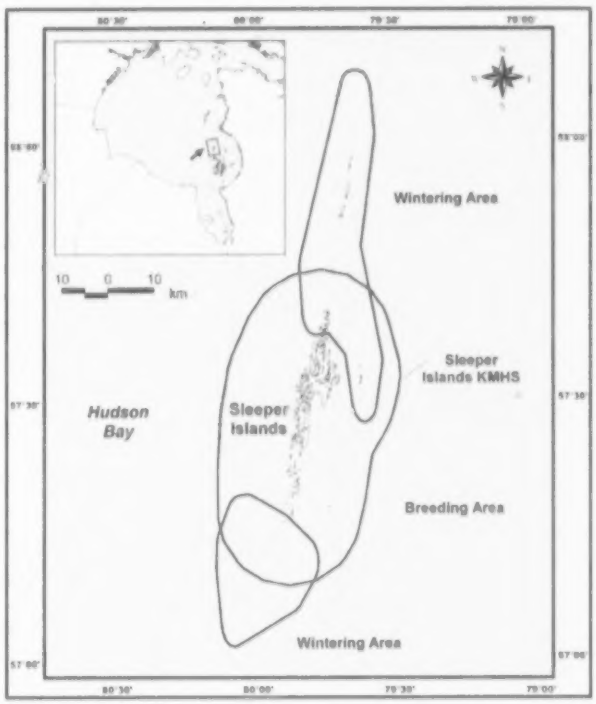
Location: 57°30'N, 79°45'W

Size: Marine – 1880 km^2; terrestrial – 90 km^2

Description: The Sleeper Islands archipelago is situated in eastern Hudson Bay, about 115 km north of the community of Sanikiluaq. The archipelago includes over 36[illegible] islands and covers about 49 km from northern to southern ex[illegible] Waters around the Sleeper Islands are relatively shallow and are situated in the Low Arctic oceanographic zone, on the boundary with the Boreal oceanographic zone (Nettleship and Evans 1985). A more detailed description of the terrestrial habitat is found in Alexander et al. (1991).

Ice forms along shorelines in October and, by November, may extend outwards for several kilometres. As the east coast of Hudson Bay is exposed to westerly winds, ice accumulation may be much less than in other areas. The ice forms quickly and continues to expand during November and December. By early January, open water is found only from the Belcher Islands south towards the mouth of James Bay and along the south coast of Hudson Bay from about the Severn River to the Great Whale River (Larnder 1968). Persistent open water occurs west and southwest of the Belcher Islands (Montgomery 1950; Freeman 1970).

Shallow coastal areas break up in May, and, in most years, Hudson Bay is relatively ice-free by mid-July (Larnder 1968).



Biological value: Hudson Bay Common Eiders *Somateria mollissima sedentaria* are year-round residents of James and Hudson bays. The population was estimated to be approximately 45 000 birds (Abraham and Finney 1986), but recent winter surveys suggest that in excess of 100 000 birds make up the *sedentaria* subspecies (H.G. Gilchrist, pers. commun.). In summer, they inhabit the entire coast of Hudson Bay from Chesterfield Inlet in the northwest to James Bay and north along the east coast of Hudson Bay to Cape Smith. In 1985, an estimated 5900 pairs of eiders (12% of the Canadian *sedentaria* population) nested on the Sleeper Islands.

In winter, eiders are restricted to areas of open water, and the majority of *S. m. sedentaria* apparently concentrate in the vicinity of open cracks and leads near the Belcher and Sleeper islands and the south shore of Hudson Bay (Freeman 1970). In September, Manning (1976) found concentrations along the west coast of the main Belcher Islands group (site 33). In early winter, the eiders move in large numbers to permanent open water west and north of the Belcher Islands, off the Sleeper Islands (depending on the distribution of ice) (Freeman 1970). In 2000, most eiders were found in open water off the northern tip of the Sleeper Islands, while in 2002, about 100 000 eiders were found in leads approximately 10 km southwest of the islands. Given that few birds were found elsewhere during survey efforts, it is likely that this concentration represented almost all of the *S. m. sedentaria* population. Over 30 species of birds have been observed in the Sleeper Islands (Manning 1976).

Ringed seals *Phoca hispida* overwinter near the Sleeper Islands, and the area supports locally high concentrations of walrus *Odobenus rosmarus* and polar bear *Ursus maritimus* (Riewe 1992; H.G. Gilchrist, pers. commun.).

Sensitivities: Eiders are sensitive to the degradation of their staging and foraging areas.

Potential conflicts: Oil exploration in central Hudson Bay is a potential source of pollution. Prevailing west and northwest winds render the east coast of the Bay most susceptible to oil damage (Nakashima and Murray 1988).

Status: The Sleeper Islands are an Important Bird Area site (NU033; CEC 1999).

References:

Abraham, K.F.; Finney, G.H. 1986. Eiders of the eastern Canadian Arctic. Pages 55–73 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Freeman, M.M.R. 1970. Observations on the seasonal behavior of the Hudson Bay Eider (*Somateria mollissima sedentaria*). Can. Field-Nat. 84:145–153.

Larnder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

Manning, T.H. 1976. Birds and mammals of the Belcher, Sleeper, Ottawa, and King George islands, NWT. Can. Wildl. Serv. Occas. Pap. No. 28, Ottawa. 40 pp.

Montgomery, M. 1950. Hudson Bay ice reconnaissance 1949–50. Arctic Circle 3:40–45.

Nakashima, D.J.; Murray, D.J. 1988. The Common Eider (*Somateria mollissima sedentaria*) of eastern Hudson Bay: a survey of nest colonies and Inuit ecological knowledge. Environmental Studies Revolving Funds Report No. 102, Ottawa. 174 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

Location: 56°30'N, 79°30'W

Size: 5–15 recurrent, small polynyas

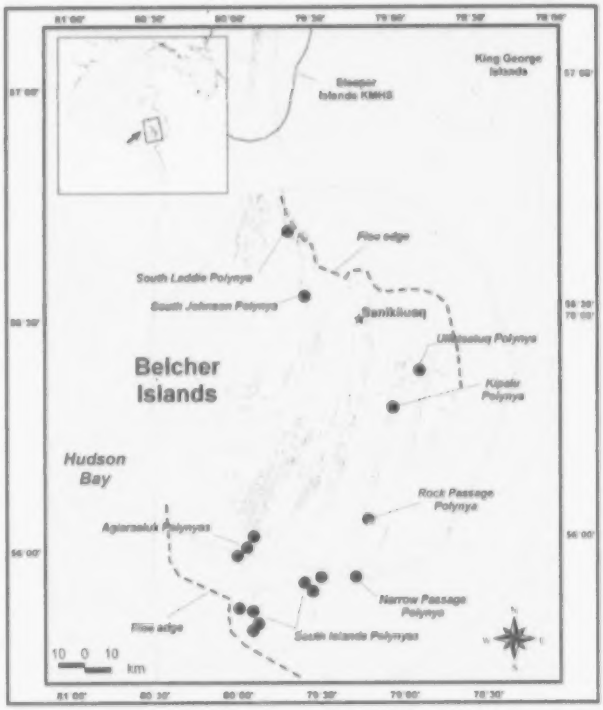
Description: The Belcher Islands are an archipelago consisting of low, bedrock islands rising from southeastern Hudson Bay. Thousands of small islands are in the archipelago and are slowly increasing in size due to isostatic rebound. The community of Sanikiluaq is on Flaherty Island. A more detailed description of the terrestrial habitat is found in Alexander et al. (1991).

Waters around the Belcher Islands are relatively shallow and are situated in the Low Arctic oceanographic zone, on the boundary with the Boreal oceanographic zone (Nettleship and Evans 1985). Currents typically flow north past the Belcher Islands, although flood tides move water south and ebb tides draw them back north (McDonald et al. 1997). Traditional Inuit knowledge suggests that currents are weaker now than in the past in this area (McDonald et al. 1997). Ice forms along shorelines in October and, by November, may extend outwards for several kilometres. As the east coast of Hudson Bay is exposed to westerly winds, ice accumulation may be much less than in other areas. The ice forms quickly and continues to expand during November and December. By early January, open water is found only from the Belcher Islands south towards the mouth of James Bay and along the south coast of Hudson Bay from about the Severn River to the Great Whale River (Larnder 1968). Tides are only about 0.5 m around the islands, but create very strong currents in the shallow water (McDonald et al. 1997). Areas of persistent open water occur around the Belcher Islands (Gilchrist and Robertson 2000), although the number can vary greatly by year. In the 1950s, there were 35 polynyas around the Belcher Islands, but in the early 1990s, there were only three (McDonald et al. 1997). Over 35 species of birds have been recorded in the Belcher Islands (Manning 1976).

Shallow coastal areas break up in May, and, in most years, Hudson Bay is relatively ice-free by mid-July (Larnder 1968).

Biological value: Hudson Bay Common Eiders *Somateria mollissima sedentaria* are year-round residents of James and Hudson bays. The population was estimated to be approximately 45 000 birds (Abraham and Finney 1986), but recent winter surveys suggest that there are now more than 100 000 *S. m. sedentaria* (H.G. Gilchrist, pers. commun.). In summer, they inhabit the entire coast of Hudson Bay from Chesterfield Inlet in the northwest to James Bay and north along the east coast of Hudson Bay to Cape Smith. Nakashima and Murray (1988) estimated that about 7000 pairs of eiders nested in the North Belcher and South Flaherty islands in the mid-1980s (7% of the Canadian population), but this number had decreased by 75% by the late 1990s (Robertson and Gilchrist 1998). Local eider populations are an important source of food and down for the community.

In winter, eiders are restricted to areas of open water, and the majority of *S. m. sedentaria* apparently concentrate in the vicinity of open cracks and leads near the Belcher and Sleeper islands (site 32) and the south shore of Hudson Bay (Freeman 1970). Around the Belcher Islands, polynyas and



the floe edge support substantial numbers of birds; Gilchrist and Robertson (2000) found up to 300 eiders and 300 Long-tailed Ducks *Clangula hyemalis* in polynyas and over 10 000 eiders wintering off the floe edge. Depending on the ice pattern and winds, thousands of birds may roost in certain polynyas (H.G. Gilchrist, unpubl. data), and wind also dictates distributions of other species (McDonald et al. 1997). Hence, open water around the Belcher Islands may support more than 10% of the Canadian population of the *sedentaria* subspecies of Common Eider in winter. As these birds do not migrate, they are susceptible to mass starvation and population declines in heavy ice years (Robertson and Gilchrist 1998).

Ringed seals *Phoca hispida* overwinter near the Sleeper Islands, as well as some beluga *Delphinapterus leucas*, and the area supports locally high concentrations of walrus *Odobenus rosmarus* and polar bear *Ursus maritimus* (Riewe 1992).

Sensitivities: Eiders are sensitive to the degradation of their staging and foraging areas and to excessive harvest of down from breeding colonies.

Potential conflicts: Oil exploration in central Hudson Bay is a potential source of pollution. Prevailing west and northwest winds render the east coast of the Bay most susceptible to oil damage (Nakashima and Murray 1988).

Status: The North Belcher and South Flaherty islands are Canadian Important Bird Areas (NU031, NU100; CEC 1999).

References:

Abraham, K.F.; Finney, G.H. 1986. Eiders of the eastern Canadian Arctic. Pages 55–73 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Freeman, M.M.R. 1970. Observations on the seasonal behavior of the Hudson Bay Eider (*Somateria mollissima sedentaria*). Can. Field-Nat. 84:145–153.

Gilchrist, H.G.; Robertson, G.J. 2000. Observations of marine birds and mammals wintering at polynyas and ice edges in the Belcher Islands, Nunavut, Canada. Arctic 53:61–68.

Lamder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

Manning, T.H. 1976. Birds and mammals of the Belcher, Sleeper, Ottawa, and King George islands, NWT. Can. Wildl. Serv. Occas. Pap. No. 28, Ottawa. 40 pp.

McDonald, M.; Arragutainaq, L.; Novalinga, Z. 1997. Voices from the Bay. Canadian Arctic Resources Committee, Ottawa. 98 pp.

Nakashima, D.J.; Murray, D.J. 1988. The Common Eider (*Somateria mollissima sedentaria*) of eastern Hudson Bay: a survey of nest colonies and Inuit ecological knowledge. Environmental Studies Revolving Funds Report No. 102, Ottawa. 174 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Riewe, R. (ed.). 1992. Nunavut atlas. Canadian Circumpolar Institute, Edmonton.

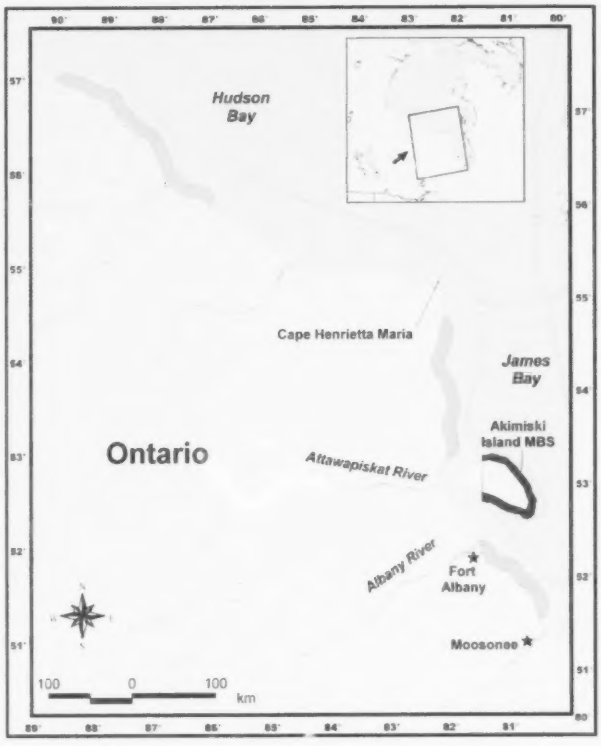
Robertson, G.J.; Gilchrist, H.G. 1998. Evidence for population declines among common eiders breeding in the Belcher Islands, Northwest Territories. Arctic 51:478–485.

Location: 54°00'N, 82°00'W

Size: Marine – 7860 km^2; terrestrial – 41 km^2

Description: The northern Ontario coastline extends along the southern edge of Hudson Bay and south into James Bay. This marine area lies just offshore of the Hudson Bay lowlands, which consist of low tundra and muskeg. Although the shoreline is part of the Province of Ontario, the waters and islands are part of Nunavut.

The waters along the coast are shallow and are located in the Boreal oceanographic zone (Nettleship and Evans 1985). Coastlines are slowly rising from Hudson Bay due to isostatic rebound. Currents typically flow east along the northern coast of the province and then south along the western shore of James Bay (McDonald et al. 1997). Tides are only about 0.5 m. Traditional Inuit knowledge suggests that ice conditions have changed from their typical pattern in the past, which may be related to climate change or perhaps to hydroelectric activity along major rivers in northern Quebec and Ontario (McDonald et al. 1997). Ice forms along shorelines in October and, by November, may extend outwards for several kilometres. By early January, ice covers most of Hudson and James bays, but open water is found towards the mouth of James Bay and along the south coast of Hudson Bay from about the Severn River to the Great Whale River (Larnder 1968). Shallow coastal areas break up in May, and, in most years, Hudson Bay is relatively ice-free by mid-July (Larnder 1968).



Biological value: Approximately 90 000 male Black Scoters *Melanitta nigra* moult along this marine area (Ross 1983, 1994), which could represent 320 000 scoters of all sexes and ages (Ross 1994). Information on Black Scoter populations is very poor; the current population estimate is approximately 185 000 breeding pairs (Bordage and Savard 1995). If so, this moulting site would hold 97% of the population. However, there are also important moulting or migration staging sites along the east coast of James Bay (Benoit et al. 1991), so the total population is probably larger than currently estimated. Nonetheless, it is clear that this marine area is critical to the annual biology of this species. Scoters moult at this location, feeding on blue mussels *Mytilus edulis* and other molluscs.

Some Hudson Bay Common Eiders *Somateria mollissima sedentaria* are year-round residents of James and Hudson bays (Abraham and Finney 1986), and Canada Geese *Branta canadensis* and Lesser Snow Geese *Chen caerulescens caerulescens* make use of coastal areas (McDonald et al. 1997).

Belugas *Delphinapterus leucas* use this area in the spring, and nearby shorelines are important denning areas for polar bears *Ursus maritimus* (McDonald et al. 1997).

Sensitivities: Seaducks are sensitive to the degradation of their staging and foraging areas.

Potential conflicts: Oil exploration in central Hudson Bay is a potential source of pollution (Nakashima and Murray 1988).

Status: Waters in James Bay are part of the James Bay Preserve (Alexander et al. 1991).

References:

Abraham, K.F.; Finney, G.H. 1986. Eiders of the eastern Canadian Arctic. Pages 55–73 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Benoit, R.; Reed, A.; Lalumière, R.; Morissette, G. 1991. Utilisation par la sauvagine des habitats côtiers de la Baie of Many Islands, Baie James. Rapport technique du Groupe Environnement Shooner inc. pour la Direction Ingénierie et Environnement de la SEBJ. 62 pp. + annexes.

Bordage, D.; Savard, J.-P.L. 1995. Black Scoter (*Melanitta nigra*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 177. The Birds of North America, Inc., Philadelphia.

Larnder, M.M. 1968. The ice. Pages 318–341 *in* C.S. Beals (ed.), Science, history, and Hudson Bay. Vol. II. Department of Energy, Mines, and Resources, Ottawa.

McDonald, M.; Arragutainaq, L.; Novalinga, Z. 1997. Voices from the Bay. Canadian Arctic Resources Committee, Ottawa. 98 pp.

Nakashima, D.J.; Murray, D.J. 1988. The Common Eider (*Somateria mollissima sedentaria*) of eastern Hudson Bay: a survey of nest colonies and Inuit ecological knowledge. Environmental Studies Revolving Funds Report No. 102, Ottawa. 174 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Ross, R.K. 1983. An estimate of the Black Scoter, *Melanitta nigra*, population moulting in James and Hudson bays. Can. Field-Nat. 97:147–150.
Ross, R.K. 1994. The Black Scoter in northern Ontario. Ont. Birds 12:1–7.

6.0 Discussion

In contrast to the terrestrial Arctic landscape, which appears frozen and static, the marine component of the Arctic is dynamic. Some marine features are found at the same location annually, such as polynyas near the Belcher Islands (Gilchrist and Robertson 2000), while others may reappear in slightly different locations or not appear at all in some years, such as the floe edge off Bylot Island in eastern Lancaster Sound (Stirling and Cleator 1981; Dickins et al. 1990). Arctic birds that use these marine areas adapt their timing of breeding and migration routes to match available habitats, making the identification of key marine habitat sites challenging. For some sites, the precise location of the key marine area will vary slightly among years as annual ice conditions vary. Moreover, the importance of individual sites may change through time in response to population fluctuations of birds and long-term changes in habitat conditions. The 34 sites described above represent those areas for which we have scientific evidence that more than 1% of the Canadian population of a bird species uses the site annually for migration, breeding, feeding, moulting, or wintering. As further information becomes available, the importance of these sites as well as others as yet unidentified will be reevaluated.

Of the sites we have identified, 20 are in the High Arctic, 13 in the Low Arctic, and 1 in the Boreal oceanographic zones (Nettleship and Evans 1985). Nearly all of the High Arctic sites are key marine areas for seabirds (alcids and procellariids) and gulls (larids). In contrast, many of the Low Arctic and Boreal sites are significant because they support nationally significant proportions of waterfowl populations at some point during the year, although the two largest Thick-billed Murre colonies in Canada are also found in this zone.

6.1 Limitations of current information

In reviewing the scientific literature and unpublished data available on these sites, a disparity in the strength of the available information becames apparent. Our best information is probably that for locations around seabird colonies (e.g., Prince Leopold Island) and discrete, isolated polynyas (e.g., Lambert Channel, Belcher Islands). For seabird colonies, high survival and breeding philopatry of marine birds result in a predictable number of birds near the colony in the summer (Gaston and Nettleship 1981). Similarly, at polynyas, the numbers of birds are predictable because there are few other areas of available open water where the species can be in the winter or during migration. Moreover, repeat surveys at polynyas continue to find large concentrations of birds (e.g., Alexander et al. 1997). Thus, in these two situations, the location of the key marine area changes very little among years, and we have high confidence in the estimated number of birds using the site.

For some of the other sites, our assessment of key habitat status is based on estimates of bird use derived principally from one set of surveys. This is particularly true for sites along the floe edge and pack ice in Baffin Bay and Davis Strait (e.g., McLaren 1982) and certain small or remote colonies (e.g., Hantzsch Island). Although these data were strong and sound, they are becoming dated; there is little new information on most of these areas in the past 25 years. The annual patterns of distribution, extent, and thickness of sea ice in the Arctic are changing rapidly (Parkinson 2000; Grumet et al. 2001). The corresponding distribution of migrating birds may be changing too.

At a few key sites (e.g., Hell Gate and Cardigan Strait), the number of birds recorded in separate surveys differed by up to an order of magnitude. The discrepancies may be due in part to the variation in annual ice conditions at the time of the surveys (Gaston and Hipfner 1998), because certain species will be adversely affected by ice breakup patterns (Hunt 1991; H.G. Gaston and A.J. Gilchrist, unpubl. data). This may be particularly evident for kittiwakes, where numbers are lower at some smaller, isolated colonies in late-ice years (Browne Island, Batty Bay). In other cases, discrepancies in estimates may be explained by differences in survey methodology. For example, the number of guillemots (a species that is cryptic and inherently difficult to survey) at Skruis Point (site 5) was estimated at 10 000 pairs in 1973 from a fixed-wing aircraft, but only 1585 birds in 1984 by helicopter. Additional surveys are needed to resolve the disparities in local population estimates, perhaps by boat or from shore.

6.2 Challenges for progress

Resolving the differences in survey estimates or conducting additional surveys is obviously essential to refine our knowledge of these key marine areas. In many ways, the marine component of the Arctic remains an unknown frontier. Ideally, more research and monitoring in this region should have been accomplished between the extensive

surveys in the 1970s and the start of this millennium. Unfortunately, our expectations cannot always be met. Much of the early survey work in the Arctic was conducted to ascertain potential environmental impacts of mining and shipping natural and refined resources to and from this region. However, the economics of extensive oil and gas or mineral extraction in the High Arctic have not yet proven profitable. In the absence of a pressing need for new information on wildlife distributions for environmental impact studies and the corresponding absence of financial resources to support them, it has been too expensive to repeat much of the survey work conducted by various biologists in the government or consulting firms (Nettleship 1980; McLaren 1982). Even for those sites for which we have solid data and we have begun to pursue official protection, the process has changed. Following the signing of various land claim agreements, the process of establishing any new protected area (migratory bird sanctuary, national wildlife area, marine wildlife area, territorial park, or national park) involves extensive consultation with communities and stakeholders and approvals from a variety of nongovernment organizations (e.g., Nunavut Wildlife Management Board, Qikiqtani Inuit Association, Nunavut Tunngavik Incorporated), and it also requires the development of an Inuit Impacts and Benefits Agreement for each site. This takes time.

6.3 Achievements

Despite the obstacles identified above, considerable progress has been made on the identification and protection of some important marine areas since the early reconnaissance work (Nettleship 1980; McLaren 1982) and since the International Biological Programme listed 71 important ecological areas in the Arctic (Revel 1981).

For the identification of marine sites, banding programs and colony-specific monitoring of marine birds have allowed us to track migration patterns (Donaldson et al. 1997), assess changes in populations of certain species (Gaston 2002), and ascertain the effects of hunting, egg collection, and pollution on certain seabirds (Gaston and Elliot 1991). At some colonies, notably at Coats Island, we have gathered sufficient data to address influences of age, predators, or annual climate patterns on reproductive success and recruitment (de Forest and Gaston 1996; Gilchrist and Gaston 1997; Gaston and Hipfner 1998), so we understand population dynamics better for some species, notably murres. Recent technological advances, such as satellite telemetry (Falk et al. 2001), have provided critical data linking habitat use by wildlife resources shared among countries, particularly Canada, the United States, and Greenland, and how key marine areas are found between the breeding grounds and wintering grounds (H.G. Gilchrist, unpubl. data). A few ecosystem-wide studies have also increased our understanding of Arctic trophic webs (Lewis et al. 1996; Hobson et al. 2001) and the importance of ice edges and polynyas to marine wildlife (Stirling 1997).

In terms of formal protection, two new migratory bird sanctuaries, two new national wildlife areas (Table 1), and two new national parks (Quttinirpaq and Sirmilik National Parks) have been created in the 1990s. There is currently work under way to create two additional national wildlife areas on eastern Baffin Island (Mallory, unpubl. data) and two national parks. Moreover, many key terrestrial habitat sites that incorporate some marine components have been identified (Alexander et al. 1991), and these have been included in land use plans (e.g., NPC 2000). In Nunavut, land use activities are reviewed through the Nunavut Impact Review Board, which distributes applications to many agencies in the North, and in this process these key sites are considered when land use proposals are submitted.

6.4 Next steps

The identification of key marine habitats for migratory birds in the Arctic is an ongoing process. The natural history, breeding ecology, and population dynamics of some Arctic marine birds require more investigation to better understand their habitat requirements. Many of the habitat sites need updated information to assess the current use and value of the area to wildlife, while other sites require increased attention to refine our current habitat delineations. Some of the next steps needed for the recognition and eventual protection of marine areas in the Arctic include:

1. Continued work with communities to establish support for the recognition and protection of key marine habitats for birds.
   - Key marine areas need to be identified and incorporated into land use plans.
   - Where merited, new national wildlife areas or marine wildlife areas should be created. As with key terrestrial sites, the creation of national wildlife areas or marine wildlife areas for marine zones will be completed and effective only with the support of local communities.
   - CWS needs to be involved in other federal, territorial, and nongovernmental initiatives on oceans management. In some cases, overlap of key marine habitat sites for migratory birds and key marine mammal sites may lead to the development of protected areas through another department (e.g., Parks Canada, Department of Fisheries and Oceans).
2. Regular monitoring at more colonies to determine annual variability in numbers.
   - Priority should be given to those colonies or marine areas that have been visited only once and those that have not been visited for some time (e.g., >20 years).
   - Where possible, systematic surveys should be conducted at sites where there have been substantial differences in estimated colony size, using consistent survey protocols.
3. New surveys of some marine regions, timed to monitor the distribution of birds at key stages of their annual cycle.
   - Priority areas for survey work include Foxe Basin, coastal Hudson Bay, Jones Sound, Cumberland Sound, and Frobisher Bay. All of these areas support high numbers of breeding, moulting, or migrating birds, but survey information is particularly insufficient or outdated.
4. More focused attention on species that have been overlooked in field studies.
   - Key species that require detailed study are Northern Fulmar, Black-legged Kittiwake, and Black Guillemot. The relationships between their annual

cycle and the role that certain marine habitats or annual climatic conditions play in their reproductive success are poorly understood in the Canadian Arctic. Potential differences in habitat use, breeding success, or population dynamics of different colonies are virtually unknown.

5. Increased work with partners to gather data on the distribution of marine birds.
    - Collaborative efforts with tourism companies offering Arctic cruises have helped to gather data on some species (e.g., Mallory et al. 2003) and should be encouraged.
    - Distribution of pamphlets and follow-up with individuals in communities (e.g., resource officers, outfitters, hunters' and trappers' organizations) may help increase information on local distributions of marine birds throughout the year.
    - Local ecological knowledge on some species can provide critical information on birds in locations or at times of the year that scientists have not examined (e.g., Gilchrist and Robertson 2000; Mallory et al. 2001).

In the early 21st century, the Arctic marine environment is experiencing increasing change. More ships are moving through this area to resupply communities and for tourism purposes (Hall and Johnston 1995). As sea ice gets thinner and decreases in area (Parkinson 2000), newspapers in Arctic communities are relating the possibility of regular transport through the Northwest Passage. The recent boom in diamond mining, new oil and gas work, and the traditional lead/zinc mines have revived concerns about potential environmental damage for Arctic marine birds. Increased attention to key marine habitat sites for migratory birds is critical to ensure the long-term conservation of this wildlife resource.

7.0 Literature cited

Alexander, S.A.; Ferguson, R.S.; McCormick, K.J. 1991. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv. Occas. Pap. No. 71, Ottawa.

Alexander, S.A.; Dickson, D.L.; Westover, S.E. 1997. Spring migration of eiders and other waterbirds in offshore areas of the western Arctic. Pages 6–20 *in* D.L. Dickson (ed.), King and Common eiders of the western Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 94, Ottawa.

Arrigo, K.R.; McClain, C.R. 1994. Spring phytoplankton production in the western Ross Sea. Science 266:161–163.

Atkinson-Willes, G.L. 1976. The numerical distribution of ducks, geese, swans, and coots as a guide in assessing the importance of wetlands in mid-winter. Pages 199–254 *in* M. Smart (ed.), Proceedings of the International Conference on the Conservation of Wetlands and Waterfowl, Heiligenhafen, Federal Republic of Germany. International Waterfowl Research Bureau, Slimbridge, U.K.

Baird, P.H. 1994. Black-legged Kittiwake (*Rissa tridactyla*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 92. The Birds of North America, Inc., Philadelphia. 28 pp.

Barber, D.; Marsden, R.; Minnett, P.; Ingram, G.; Fortier, L. 2001. Physical processes within the North Water (NOW) Polynya. Atmosphere-Ocean 39:163–166.

Barry, T.W. 1968. Observations of natural mortality and native use of eider ducks along the Beaufort Sea coast. Can. Field-Nat. 82:140–144.

Barry, T.W. 1986. Eiders of the western Canadian Arctic. Pages 74–81 *in* A. Reed (ed.), Eider ducks in Canada. Can. Wildl. Serv. Occas. Pap. No. 47, Ottawa.

Béchet, A.; Martin, J.-L.; Meister, P.; Rabouam, C. 2000. A second breeding site for Ross's Gull (*Rhodostethia rosea*) in Nunavut, Canada. Arctic 53:234–236.

Bordage, D.; Savard, J.-P.L. 1995. Black Scoter (*Melanitta nigra*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 177. The Birds of North America, Inc., Philadelphia.

Bradstreet, M.S.W.; Brown, R.G.B. 1985. Feeding ecology of the Atlantic Alcidae. Pages 264–318 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

Brown, R.G.B.; Nettleship, D.N. 1981. The biological significance of polynyas to arctic colonial seabirds. Pages 56–66 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Brown, R.G.B.; Nettleship, D.N.; Germain, P.; Tull, C.E.; Davis, T. 1975. Atlas of eastern Canadian seabirds. Canadian Wildlife Service, Ottawa. 220 pp.

Butler, R.G.; Buckley, D.E. 2002. Black Guillemot (*Cepphus grylle*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 675. The Birds of North America, Inc., Philadelphia.

Canadian Wildlife Service. 1989. A review of bird sanctuaries in the Northwest Territories (in response to the DIAND Northern Mineral Policy). Unpublished report, Canadian Wildlife Service, Yellowknife.

CEC. 1999. North American Important Bird Areas. Commission for Environmental Cooperation, Montreal. 359 pp. (see also www.ibacanada.com).

Chapdelaine, G. 1997. Pattern of recoveries of banded razorbills (*Alca torda*) in the western Atlantic and survival rates of adults and immatures. Colon. Waterbirds 20:47–54.

Chapdelaine, G.; Diamond, A.W.; Elliot, R.D.; Robertson, G.J. 2001. Status and population trends of the Razorbill in eastern North America. Can. Wildl. Serv. Occas. Pap. No. 105, Ottawa.

Costanza, R.; Andrade, F.; Antunes, P.; van den Belt, M.; Boersma, D.; Boesch, D.F.; Catarino, F.; Hanna, S.; Limburg, K.; Low, B.; Molitor, M.; Pereira, J.G.; Rayner, S.; Santos, R. 1998. Principles for sustainable governance of the oceans. Science 281:198–199.

Day, J.C.; Roff, J.C. 2000. Planning for representative marine protected areas — a framework for Canada's oceans. World Wildlife Fund Canada, Toronto.

Day, R.; Stenhouse, I.; Gilchrist, H.G. 2001. The Sabine's Gull, *Xema sabini*. *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 593. The Birds of North America, Inc., Philadelphia.

de Forest, L.N.; Gaston, A.J. 1996. The effect of age on timing of breeding and reproductive success in the Thick-billed Murre. Ecology 77:1001–1011.

Dickins, D.; Bjerkelund, K.; Vonk, P.; Potter, S.; Finley, K.; Stephen, R.; Holdsworth, C.; Reimer, D.; Godon, A.; Duval, W.; Buist, I.; Sekerak, A. 1990. Lancaster Sound Region — a coastal atlas for environmental protection. DF Dickins Associates Ltd., Vancouver.

Dickson, D.L.; Gilchrist, H.G. 2001. Status of marine birds of the southeastern Beaufort Sea. Arctic 55 (Suppl. 1):46–58.

Donaldson, G.M.; Gaston, A.J.; Chardine, J.W.; Kampp, K.; Nettleship, D.N.; Elliot, R.D. 1997. Winter distributions of Thick-billed Murres from the eastern Canadian Arctic and western Greenland in relation to age and time of year. Can. Wildl. Serv. Occas. Pap. No. 96, Ottawa.

Durinck, J.; Falk, K. 1996. The distribution and abundance of seabirds off southwestern Greenland in autumn and winter 1988–1989. Polar Res. 15:23–42.

Eng, M.; Green, J.; Little, L.; Auchterlonie, S. 1989. A review of International Biological Programme sites in the Northwest Territories. Unpublished report, International Biological Programme Working Group, Yellowknife.

Falk, K.; Moeller, S. 1995. Satellite tracking of high-arctic northern fulmars. Polar Biol. 15:495–502.

Falk, K.; Dall'Antonia, L.; Benvenutti, S. 2001. Mapping pre- and post-fledging foraging locations of thick-billed murres in the North Water Polynya. Ecography 24:625–632.

Fisheries and Oceans Canada. 1997. The role of the federal government in the oceans sector. Fisheries and Oceans Canada, Ottawa. 38 pp.

Fisheries and Oceans Canada. 1999. Marine environmental handbook — Arctic and Northwest Passage. Fisheries and Oceans Canada, Ottawa. 136 pp.

Fournier, M.A.; Hines, J.E. 1994. Effects of starvation on muscle and organ mass of King Eiders *Somateria spectabilis* and the ecological and management implications. Wildfowl 45:188–197.

Fuller, R.J. 1980. A method of assessing the ornithological interest of sites for conservation. Biol. Conserv. 17:229–239.

Gaston, A.J. 1996. Conservation issues for Canadian Wildlife Service priorities for marine birds. Unpublished report, Canadian Wildlife Service, Ottawa. 32 pp.

Gaston, A.J. 2002. Studies of high-latitude seabirds. 5. Monitoring Thick-billed Murres in the eastern Canadian Arctic, 1976–2000. Can. Wildl. Serv. Occas. Pap. No. 106, Ottawa.

Gaston, A.J.; Elliot, R.D. 1991. Studies of high-latitude seabirds. 2. Conservation biology of Thick-billed Murres in the Northwest Atlantic. Can. Wildl. Serv. Occas. Pap. No. 69, Ottawa.

Gaston, A.J.; Hipfner, J.M. 1998. The effect of ice conditions in northern Hudson Bay on breeding by Thick-billed Murres (*Uria lomvia*). Can. J. Zool. 76:480–492.

Gaston, A.J.; Hipfner, J.M. 2000. Thick-billed Murre (*Uria lomvia*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 497. The Birds of North America Inc., Philadelphia.

Gaston, A.J.; Nettleship, D.N. 1981. The thick-billed murres of Prince Leopold Island. Can. Wildl. Serv. Monogr. No. 6. 350 pp.

Gaston, A.J.; Cairns, D.K.; Elliot, R.D.; Noble, D.G. 1985. A natural history of Digges Sound. Can. Wildl. Serv. Occas. Pap. No. 46, Ottawa. 62 pp.

Gilchrist, H.G. 2001. Glaucous Gull (*Larus hyperboreus*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 573. The Birds of North America, Inc., Philadelphia.

Gilchrist, H.G.; Gaston, A.J. 1997. Effects of murre nest site characteristics and wind conditions on predation by glaucous gulls. Can. J. Zool. 75:518–524.

Gilchrist, H.G.; Robertson, G.J. 2000. Observations of marine birds and mammals wintering at polynyas and ice edges in the Belcher Islands, Nunavut, Canada. Arctic 53:61–68.

Godfrey, W.E. 1986. The birds of Canada. National Museum of Natural Sciences, Ottawa. 595 pp.

Goudie, R.I.; Robertson, G.J.; Reed, A. 2000. Common Eider (*Somateria mollissima*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 546. The Birds of North America, Inc., Philadelphia.

Government of Canada. 2002. Bill C-5. An Act respecting the protection of wildlife species at risk in Canada. Canadian Wildlife Service, Ottawa.

Grumet, N.S.; Wake, C.P.; Mayewski, P.A.; Zielinski, G.A.; Whitlow, S.I.; Koerner, R.M.; Fisher, D.A.; Woollett, J.M. 2001. Variability of sea-ice extent in Baffin Bay over the last millennium. Climate Change 49:129–145.

Hall, C.M.; Johnston, M.E. 1995. Polar tourism: tourism in the Arctic and Antarctic regions. Wiley & Sons, New York.

Hatch, S.A.; Nettleship, D.N. 1998. Northern Fulmar (*Fulmarus glacialis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 361. The Birds of North America Inc., Philadelphia.

Hatch, S.A.; Myers, P.M.; Mulcahy, D.M.; Douglas, D.C. 2000. Seasonal movements and pelagic habitat use of murres and puffins determined by satellite telemetry. Condor 102:145–154.

Healey, M.C.; Wallace, R.R. (eds.). 1987. Canadian aquatic resources. Can. Bull. Fish. Aquat. Sci. 215:1–533.

Hirche, H.-J.; Baumann, M.E.M.; Kattner, G.; Gradinger, R. 1991. Plankton distribution and the impact of copepod grazing on primary production in Fram Strait, Greenland Sea. J. Mar. Syst. 2:477–494.

Hobson, K.A.; Gilchrist, H.G.; Falk, K. 2001. Isotopic investigations of seabirds of the North Water Polynya: contrasting trophic relationships between the eastern and western sectors. Condor 104:1–11.

Huettmann, F.; Diamond, A.W. 2000. Seabird migration in the Canadian northwest Atlantic Ocean: moulting locations and movement patterns of immature birds. Can. J. Zool. 78:624–647.

Hunt, G.L., Jr. 1991. Marine ecology of seabirds in polar oceans. Am. Zool. 31:131–142.

Hyslop, C. (ed.). 1996. Bird Trends No. 5. Canadian Wildlife Service, Ottawa. 32 pp.

Jamieson, G.S.; Levings, C.O. 2001. Marine protected areas in Canada — implications for both conservation and fisheries management. Can. J. Fish. Aquat. Sci. 58:138–156.

Johnson, S.R.; Renaud, W.E.; Richardson, W.J.; Davis, R.A.; Holdsworth, C.; Hollingdale, P.D. 1976. Aerial surveys of birds in eastern Lancaster Sound, 1976. LGL Ltd. environmental research associates for Norlands Petroleum, Calgary. 365 pp.

Kelleher, G. 1994. Coastal marine protected areas. Pages 54–81 *in* J.A. McNeely, J. Harrison, and P. Dingwall (eds.), Protecting nature: regional reviews of protected areas. International Union for the Conservation of Nature and Natural Resources, Gland, Switzerland. 402 pp.

Lewis, E.L.; Ponton, D.; Legendre, L.; LeBlanc, B. 1996. Springtime sensible heat, nutrients and phytoplankton in the Northwater polynya, Canadian Arctic. Cont. Shelf Res. 16:1775–1792.

Macey, A. 1981. Status report on Ross' gull, *Rhodostethia rosea*, in Canada, 1980. Unpublished report, Committee on the Status of Endangered Wildlife in Canada, Ottawa. 55 pp.

MacLaren Atlantic Ltd. 1978. Appendix A — Seabird distribution maps. Unpublished report for Imperial Oil Ltd., Aquitaine Co. of Canada Ltd., and Arctic Petroleum Operators Association, Dartmouth. 172 pp.

Mallory, M.L.; Akearok, J.; Fontaine, A.J. 2001. Community knowledge on the distribution and abundance of species at risk in southern Baffin Island, Nunavut, Canada. Can. Wildl. Serv. Tech. Rep. No. 363.

Mallory, M.L.; Gilchrist, H.G.; Fontaine, A.J.; Akearok, J.A. 2003. Local ecological knowledge of ivory gull declines in Arctic Canada. Arctic 56:293–298.

McLaren, P.L. 1982. Spring migration and habitat use by seabirds in eastern Lancaster Sound and western Baffin Bay. Arctic 35:88–111.

Melling, H.; Gratton, Y.; Ingram, G. 2001. Oceanic circulation within the North Water Polynya in Baffin Bay. Atmosphere-Ocean 39:301–325.

Mercier, F.; Mondor, C. 1995. Sea to sea to sea: Canada's national marine conservation system plan. Parks Canada, Department of Canadian Heritage, Ottawa. 106 pp.

Montevecchi, W.A. (ed.). 1996. Studies of high-latitude seabirds. 4. Trophic relationships and energetics of endotherms in cold ocean systems. Can. Wildl. Serv. Occas. Pap. No. 91, Ottawa.

Montevecchi, W.A.; Gaston, A.J. 1991. Studies of high-latitude seabirds. 1. Behavioural, energetic, and oceanographic aspects of seabird feeding ecology. Can. Wildl. Serv. Occas. Pap. No. 68, Ottawa.

Natural Resources Canada. 1996. The Minerals and Metals Policy of the Government of Canada. Partnerships for sustainable development. Natural Resources Canada, Ottawa. 35 pp.

Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada: identity, distribution, and abundance. Unpublished report, Canadian Wildlife Service, Ottawa. 133 pp.

Nettleship, D.N.; Evans, P.J. 1985. Distribution and status of the Atlantic Alcidae. Pages 53–154 *in* D.N. Nettleship and T.R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, London, U.K.

NPC. 2000. North Baffin regional land use plan, 2000. Nunavut Planning Commission, Taloyoak.

Parkinson, C.L. 2000. Variability of arctic sea ice: the view from space, an 18-year record. Arctic 53:341–358.

Prach, R.W.; Boyd, H.; Cooch, F.G. 1981. Polynyas and sea ducks. Pages 67–70 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Prater, A.J. 1976. The distribution of coastal waders in Europe and North Africa. Pages 255–271 *in* M. Smart (ed.), Proceedings of the International Conference on the Conservation of Wetlands and Waterfowl, Heiligenhafen, Federal Republic of Germany. International Waterfowl Research Bureau, Slimbridge, U.K.

Reed, A.; Ward, D.H.; Derksen, D.V.; Sedinger, J.S. 1998. Brant (*Branta bernicla*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 337. The Birds of North America, Inc., Philadelphia.

Renaud, W.E.; McLaren, P.L.; Johnson, S.R. 1982. The Dovekie, *Alle alle*, a spring migrant to eastern Lancaster Sound and western Baffin Bay. Arctic 35:118–125.

Revel, R.D. 1981. Conservation in northern Canada: International Biological Programme conservation sites revisited. Biol. Conserv. 21:263–287.

Robards, M.; Gilchrist, H.G.; Allard, K. 2000. Breeding Atlantic puffins, *Fratercula arctica*, and other bird species of Coburg Island, Nunavut. Can. Field-Nat. 114:72–77.

Robertson, G.J.; Gilchrist, H.G. 1998. Evidence for population declines among common eiders breeding in the Belcher Islands, Northwest Territories. Arctic 51:478–485.

Robertson, G.J.; Savard, J.-P.L. 2002. Long-tailed Duck (*Clangula hyemalis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 651. The Birds of North America, Inc., Philadelphia.

Smith, M.; Rigby, B. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7–28 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Stirling, I. 1981. Introduction. Pages 5–6 *in* I. Stirling and H. Cleator (eds.), Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Stirling, I. 1997. The importance of polynyas, ice edges, and leads to marine mammals and birds. J. Mar. Syst. 10:9–21.

Stirling, I.; Cleator, H. (eds.). 1981. Polynyas in the Canadian Arctic. Can. Wildl. Serv. Occas. Pap. No. 45, Ottawa.

Suydam, R.S. 2000. King Eider (*Somateria spectabilis*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 491. The Birds of North America, Inc., Philadelphia. 28 pp.

Thomas, V.G.; MacDonald, S.D. 1987. The breeding distribution and current population status of the ivory gull in Canada. Arctic 43:211–218.

Tuck, L.M.; Squires, H.J. 1955. Food and feeding habits of Brunnich's Murre (*Uria lomvia lomvia*) on Akpatok Island. J. Fish. Res. Board Can. 12:781–792.

Ward, J.G. 1979. Bird and mammal surveys in the Cape Parry area, Northwest Territories, June–August 1979. Unpublished report, LGL Ltd. environmental research associates for Dome Petroleum Ltd., Calgary. 40 pp.

Zurbrigg, E.J. 1996. Towards an Environment Canada strategy for coastal and marine protected areas. Unpublished report, Canadian Wildlife Service, Ottawa. 24 pp.

Appendices

Appendix A
Federal powers for protecting marine areas (from Jamieson and Levings 2001)

Agency	Legislative tools	Designations	Mandates
Environment Canada	*Canada Wildlife Act*	National Wildlife Areas	To protect and conserve marine areas that are nationally or internationally significant for all wildlife, but focusing on migratory marine birds
	Migratory Birds Convention Act	Migratory Bird Sanctuaries	To protect coastal and marine habitats that are heavily used by birds for breeding, feeding, migration, and overwintering
Fisheries and Oceans Canada	*Oceans Act*	Marine Protected Areas	To protect and conserve: • fisheries resources, including marine mammals and their habitats • endangered or threatened species and their habitats • unique habitats • areas of high biodiversity or biological productivity • areas for scientific and research purposes
	Fisheries Act	Fisheries closures	Conservation mandate to manage and regulate fisheries, conserve and protect fish, protect fish habitat, and prevent pollution of waters frequented by fish
Parks Canada	*National Parks Act*	National Parks	To protect and conserve for all time marine conservation areas of Canadian significance that are representative of natural marine regions and to encourage public understanding, appreciation, and enjoyment
	Proposed *National Marine Conservation Areas Act*	Proposed Marine Conservation Areas	

Appendix B
Federal oceans-related legislation (Fisheries and Oceans Canada 1997)

Legislation	Purpose as it relates to ocean programs
Minister of Canadian Heritage	
National Parks Act	Provides for the establishment of marine parks
Minister of Environment	
Canada Wildlife Act	Wildlife conservation, research, and interpretation, especially through partnerships and establishment of protected marine areas for wildlife
Canadian Environmental Assessment Act	Integration of environmental factors into federal planning and decision-making
Canadian Environmental Protection Act	Provides for establishment of marine environmental quality guidelines; ocean disposal; and control of land-based sources of pollution, offshore oil and gas, and toxic substances
Fisheries Act (subsections 36–42)	Control of pollution from land-based sources, toxic substances, offshore oil and mineral resources development
Government Organization Act	Assigns responsibility for ice services, marine weather, and marine climate
Migratory Birds Convention Act	Migratory bird conservation
Minister of Fisheries and Oceans	
Canada Shipping Act	Marine navigation, marine search and rescue, pleasure craft safety, marine ship-source pollution prevention and response, lighthouses, receiver of wrecks, support to other federal departments and agencies
Coastal Fisheries Protection Act	Monitoring, control, and surveillance
Fisheries Act	Conservation and management of fisheries and habitats, licensing, enforcement, international fisheries agreements
Fisheries Development Act	Fisheries enhancement and development, aquaculture, and resource development research
Fishing and Recreational Harbours Act	Small craft harbours
Fish Inspection Act	Promotes and supports the value, wholesomeness, and marketability of fish products produced or sold in Canada

Continued on next page

Appendix B (*cont'd*)
Federal oceans-related legislation (Fisheries and Oceans Canada 1997)

Legislation	Purpose as it relates to ocean programs
Government Organization Act	Assigns responsibility for physical oceanography, chemical oceanography, marine ecology, oceans policy development
Navigable Waters Protection Act	Protects the public right of navigation by providing for removal of obstructions and provides an approval mechanism for planned obstructions
Oceans Act	Declares Canada's maritime zones in accordance with the provisions of the United Nations Convention on the Law of the Sea; provides for the development and implementation of a national oceans management strategy; and provides for the consolidation and clarification of federal responsibilities for the management of Canada's oceans
Minister of Foreign Affairs and International Trade	
Coasting Trade Act	Governs the granting of authority to foreign vessels wishing to conduct marine research within Canada's exclusive economic zones
Foreign Affairs and International Trade Act	Maritime boundary disputes, Law of the Sea
Oceans Act	Establishes Canadian maritime boundaries
Minister of Health	
Food and Drugs Act	Ensures safe use of marine species for human consumption
Minister of Indian and Northern Affairs	
Arctic Waters Pollution Prevention Act	Regulations controlling the deposit of waste north of 60° latitude
Canada Petroleum Resources Act	Regulates interest in petroleum in relation to frontier lands
Nunavut Land Claims Agreement	Puts into effect land claim agreement
Western Arctic (Inuvialuit) Claims Settlement Act	Puts into effect land claim agreement
Minister of Industry	
Government Organization Act, Atlantic Canada 1987	Regional economic development
National Research Council Act	Established the National Research Council, which includes marine engineering, marine biology research
Natural Sciences and Engineering Research Act	Established the Natural Sciences and Engineering Research Council, which provides grant support to universities
Western Economic Diversification Act	Regional economic development
Minister of Justice	
Department of Justice Act	Conduct of litigation (including international)
Oceans Act	Some federal and provincial laws can be applied in some parts of the sea to regulate activities that fall under Canadian jurisdiction (e.g., oil and gas exploration and exploitation)
Minister of National Defence	
Canada Shipping Act	Search and rescue
Emergencies Act	Permits temporary measures to ensure safety and security of Canadians
International Convention for the Safety of Life at Sea	Search and rescue
National Defence Act	Maritime command
Minister of Natural Resources Canada	
Arctic Waters Pollution Prevention Act	Provisions concerning natural resources in areas of the Canadian Arctic for which the Minister has administrative responsibility
Canada–Newfoundland Atlantic Accord Implementation Act	Development of offshore resources in Newfoundland
Canada–Nova Scotia Offshore Petroleum Resources Accord Implementation Act	Development of offshore resources in Nova Scotia
Canada Oil and Gas Operations Act	Regulation of exploration and exploitation of oil and gas
Canada Petroleum Resources Act	Regulates interest in petroleum in relation to frontier lands
Resources and Technical Surveys Act	Provides for surveys
Minister of Public Works and Government Services	
Department of Public Works and Government Services Act	Provides for the acquisition services for goods and materiel, major Crown projects, Crown assets distribution and disposal, marine architecture and engineering, dredging, fleet services, and other real property services
Minister of Transport	
Canada Shipping Act	Services for the safe, economical, and efficient movement of ships in Canadian waters
Coasting Trade Act	Reserves cabotage in Canadian waters to domestic ships and provides for temporary use of foreign ships when no suitable Canadian ship is available; applies to transportation of passenger and cargo and activities of a commercial nature
Government Organization Act	Includes control of ship-source discharge
International Convention for the Safety of Life at Sea	Search and rescue
National Transportation Act (1987)	Review of mergers and acquisitions of marine undertakings; licensing of northern marine resupply; dispute resolution mechanisms for shippers and carriers in the marine mode
Pilotage Act	Marine pilotage in certain waters of Canada

Continued on next page

Appendix B (*cont'd*)
Federal oceans-related legislation (Fisheries and Oceans Canada 1997)

Legislation	Purpose as it relates to ocean programs
Public Harbours and Port Facilities Act	Provides for the management of public harbours and port facilities
St. Lawrence Seaway Authority Act	Seaway operations
Shipping Conference Exemptions Act, 1987	Provides an exemption from Canadian competition law to national and international shipping lines to collectively set prices, terms, and conditions for international marine transportation; does not apply to domestic marine transportation
Privy Council Office	
Canadian Transportation Accident Investigation and Safety Board Act	Transport accident investigation

Appendix C
International and continental conservation initiatives for birds using marine areas

International

- Convention on the Conservation of Wetlands of International Importance (Ramsar Convention) (1975)
- Convention on Biological Diversity (1994)
    - Jakarta Mandate (1995)
- International Biological Programme (IBP) Sites
- Convention on the Law of the Sea (CLOS) (1994)
- Global Program of Action (GPA) (1995)
- World Heritage Convention (1994)
- Arctic Environmental Protection Strategy (1991)
    - Conservation of Arctic Flora and Fauna (CAFF)
    - Circumpolar Protected Areas Network
- Western Hemisphere Shorebird Reserve Network (WHSRN)
- Agenda 21
- International Convention on the Prevention of Pollution from Ships
- Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter
- International Convention of Oil Pollution Preparedness, Response and Cooperation

Continental

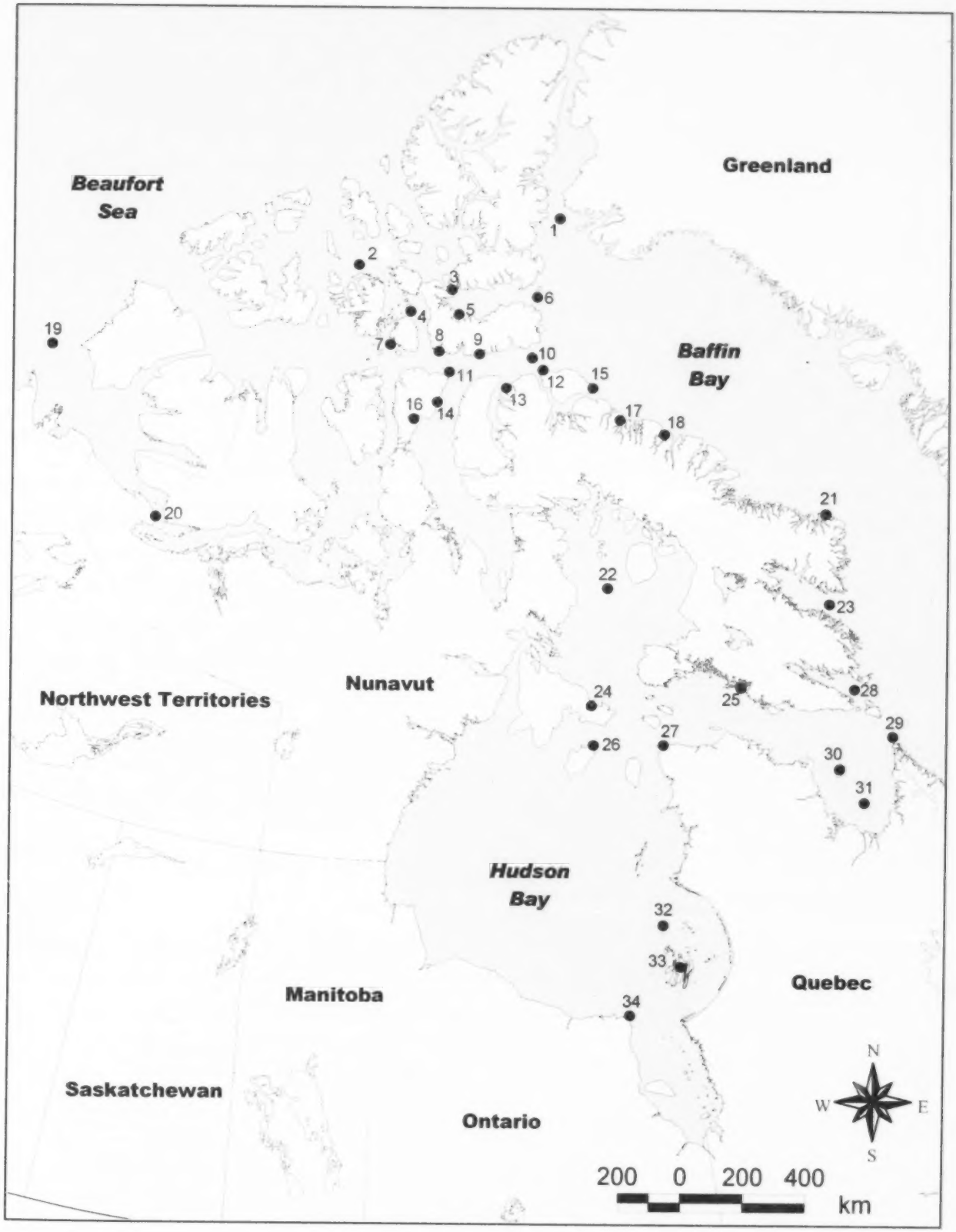
- North American Bird Conservation Initiative (NABCI), including:
    - North American Waterfowl Management Plan (NAWMP)
    - Partners in Flight (PIF)
    - Canadian Shorebird Conservation Plan
    - Wings Over Water (WOW)

Recent publications in the Occasional Papers series

No. 54
Waterfowl studies in Ontario, 1973-81, by S.G. Curtis, D.G. Dennis, and H. Boyd, eds. Disponible également en français.
Cat. No. CW69-1/54E. Publ. 1985.
No. 55
The reported kill of ducks and geese in Canada and the USA, 1974-82, by Hugh Boyd. Disponible également en français.
Cat. No. CW69-1/55E. Publ. 1985.
No. 56
Population dynamics of the Common Loon (*Gavia immer*) associated with mercury-contaminated waters in northwestern Ontario, by J.F. Barr. Disponible également en français.
Cat. No. CW69-1/56E. Publ. 1986.
No. 57
The Ring-billed Gull in Ontario: a review of a new problem species, by H. Blokpoel and G.D. Tessier. Disponible également en français.
Cat. No. CW69-1/57E. Publ. 1986.
No. 58
The birds of the Creston Valley and southeastern British Columbia, by R.W. Butler, B.G. Stushnoff, and E. McMackin. Disponible également en français.
Cat. No. CW69-1/58E. Publ. 1986.
No. 59
Estimating densities of birds at sea and the proportion in flight from counts made on transects of indefinite width, by A.J. Gaston, B.T. Collins, and A.W. Diamond. Disponible également en français.
Cat. No. CW69-1/59E. Publ. 1987.
No. 60
Waterfowl breeding population surveys, Atlantic Provinces, by A.J. Erskine, ed. Disponible également en français.
Cat. No. CW69-1/60E. Publ. 1987.
No. 61
A survey of Lesser Snow Geese on Southampton and Baffin islands, NWT, 1979, by A. Reed, P. Dupuis, and G.E.J. Smith. Disponible également en français.
Cat. No. CW69-1/61E. Publ. 1987.
No. 62
Studies of the effects of acidification on aquatic wildlife in Canada: waterfowl and trophic relationships in small lakes in northern Ontario, by D.K. McNicol, B.E. Bendell, and R.K. Ross. Disponible également en français.
Cat. No. CW69-1/62E. Publ. 1987.
No. 63
Bison ecology in relation to agricultural development in the Slave River lowlands, NWT, by H.W. Reynolds and A.W.L. Hawley, eds.
Cat. No. CW69-1/63E. Publ. 1987.
No. 64
A simulation model for the Greater Snow Goose population, by J. Gauvin and A. Reed. Disponible également en français.
Cat. No. CW69-1/64E. Publ. 1987.
No. 65
The birds of the Fraser River delta: populations, ecology and international significance, by Robert W. Butler and R.Wayne Campbell.
Cat. No. CW69-1/65E. Publ. 1987.
No. 66
Mortality of migratory barren-ground caribou on the calving grounds of the Beverly herd, Northwest Territories, 1981-83, by Frank L. Miller, Eric Broughton, and Anne Gunn.
Cat. No. CW69-1/66E. Publ. 1988.
No. 67
Studies of the effects of acidification on aquatic wildlife in Canada: Lacustrine birds and their habitats in Quebec, by Jean-Luc DesGranges, ed. Disponible également en français.
Cat. No. CW69-1/67E. Publ. 1989.
No. 68
Studies of high-latitude seabirds. 1. Behavioural, energetic, and oceanographic aspects of seabird feeding ecology, by W.A. Montevecchi and A.J. Gaston, eds.
Cat. No. CW69-1/68E. Publ. 1991.
No. 69
Studies of high-latitude seabirds. 2. Conservation biology of Thick-billed Murres in the Northwest Atlantic, by A.J. Gaston and R.D. Elliot, eds.
Cat. No. CW69-1/69E. Publ. 1991.
No. 70
Habitats of the northeast coast of James Bay, by N. Dignard, R. Lalumière, A. Reed, and M. Julien. Disponible également en français.
Cat. No. CW69-1/70E. Publ. 1991.
No. 71
Key migratory bird terrestrial habitat sites in the Northwest Territories (2nd edition), by Stuart A. Alexander, Robert S. Ferguson, and Kevin J. McCormick.
Cat. No. CW69-1/71E. Publ. 1991.
No. 72
Atlas of pelagic birds of western Canada, by K.H. Morgan, K. Vermeer, and R.W. McKelvey.
Cat. No. CW69-1/72E. Publ. 1991.
No. 73
The Red-throated Loon as an indicator of environmental quality, by D. Lynne Dickson. Disponible également en français.
Cat. No. CW69-1/73E. Publ. 1992.
No. 74
Aerial radio-tracking of Whooping Cranes migrating between Wood Buffalo National Park and Aransas National Wildlife Refuge, 1981-84, by E. Kuyt.
Cat. No. CW69-1/74E. Publ. 1992.
No. 75
The ecology, status, and conservation of marine and shoreline birds on the west coast of Vancouver Island, by K. Vermeer, R.W. Butler, and K.H. Morgan, eds.
Cat. No. CW69-1/75E. Publ. 1992.
No. 76
Declines in Canadian amphibian populations: designing a national monitoring strategy, by C.A. Bishop, K.E. Pettit, eds.
Cat. No. CW69-1/76E. Publ. 1992.
No. 77
Studies of high-latitude seabirds. 3. A model of the energy demands of the seabirds of eastern and Arctic Canada, by A.W. Diamond, A.J. Gaston, and R.G.B. Brown (edited by W.A. Montevecchi).
Cat. No. CW69-1/77E. Publ. 1993.

No. 78
Historical review of water bird populations and annotated list of water birds associated with Burlington Bay, Lake Ontario, 1857-1990, by M.B. Gebauer, R.Z. Dobos, and D. Vaughn Weseloh.
Cat. No. CW69-1/78E. Publ. 1993.
No. 79
Hydrological classification of Canadian prairie wetlands and prediction of wetland inundation in response to climatic variability, by Ming-ko Woo, Robert D. Rowsell, and Robert G. Clark.
Cat. No. CW69-1/79E. Publ. 1993.
No. 80
Monitoring Thick-billed Murre populations at colonies in northern Hudson Bay, 1972-92, by A.J. Gaston, L.N. de Forest, G. Gilchrist, and D.N. Nettleship.
Cat. No. CW69-1/80E. Publ. 1994.
No. 81
Colonies and numbers of Ross' Geese and Lesser Snow Geese in the Queen Maud Gulf Migratory Bird Sanctuary, by R.H. Kerbes.
Cat. No. CW69-1/81E. Publ. 1994.
No. 82
The 1991 International Piping Plover Census in Canada, by S.P. Flemming, ed.
Cat. No. CW69-1/82E. Publ. 1994.
No. 83
The abundance and distribution of estuarine birds in the Strait of Georgia, British Columbia, by R.W. Butler and K. Vermeer, eds.
Cat. No. CW69-1/83E. Publ. 1994.
No. 84
Wintering populations of Lesser Snow Geese and Ross' Geese in the Northern Highlands of México, 1988-1990, by Bruce Turner, Roy Tomlinson, Raquel Leyva, and Pablo Dominguez.
Cat. No. CW69-1/84E. Publ. 1994.
No. 85
Caspian Terns on the Great Lakes: organochlorine contamination, reproduction, diet, and population changes, 1972-91, by Peter J. Ewins, D.V. (Chip) Weseloh, Ross J. Norstrom, Karin Legierse, Heidi J. Auman, and James P. Ludwig.
Cat. No. CW69-1/85E. Publ. 1994.
No. 86
The patient predator: foraging and population ecology of the Great Blue Heron *Ardea herodias* in British Columbia, by Robert W. Butler.
Cat. No. CW69-1/86E. Publ. 1995.
No. 87
Use of various habitat types by nesting ducks on islands in the St. Lawrence River between Montréal and Trois-Rivières, by Luc Bélanger and Denis Lehoux. Disponible également en français.
Cat. No. CW69-1/87E. Publ. 1995.
No. 88
A review of the environmental impacts of lead shotshell ammunition and lead fishing weights in Canada, by A.M. Scheuhammer and S.L. Norris. Disponible également en français.
Cat. No. CW69-1/88E. Publ. 1995.
No. 89
The colonial waterbirds of Great Slave Lake, Northwest Territories: an annotated atlas, by J. Sirois, M.A. Fournier, and M.F. Kay.
Cat. No. CW69-1/89E. Publ. 1995.
No. 90
Duck use of the coastal habitats of northeastern James Bay, by Austin Reed, Réjean Benoit, Richard Lalumière, and Michel Julien. Disponible également en français.
Cat. No. CW69-1/90E. Publ. 1996.
No. 91
Studies of high-latitude seabirds. 4. Trophic relationships and energetics of endotherms in cold ocean systems, by W.A. Montevecchi, ed.
Cat. No. CW69-1/91E. Publ. 1996.
No. 92
Goose use of the coastal habitats of northeastern James Bay, by Austin Reed, Réjean Benoit, Michel Julien, and Richard Lalumière. Disponible également en français.
Cat. No. CW69-1/92E. Publ. 1996.
No. 93
The ecology, status, and conservation of marine and shoreline birds of the Queen Charlotte Islands by K. Vermeer and K.H. Morgan, eds.
Cat. No. CW69-1/93E. Publ. 1997.
No. 94
King and Common eiders of the western Canadian Arctic, by D. Lynne Dickson, ed.
Cat. No. CW69-1/94E. Publ. 1997.
No. 95
Monitoring bird populations: the Canadian experience, by Erica H. Dunn, Michael D. Cadman, and J. Bruce Falls, eds.
Cat. No. CW69-1/95E. Publ. 1997.
No. 96
Winter distributions of Thick-billed Murres from the eastern Canadian Arctic and western Greenland in relation to age and time of year, by G.M. Donaldson, A.J. Gaston, J.W. Chardine, K. Kampp, D.N. Nettleship, and R.D. Elliot.
Cat. No. CW69-1/96E. Publ. 1997.
No. 97
Shorebird migration and staging at a large prairie lake and wetland complex: the Quill Lakes, Saskatchewan, by Stuart A. Alexander and Cheri L. Gratto-Trevor.
Cat. No. CW69-1/97E. Publ. 1997.
No. 98
Distribution, survival, and numbers of Lesser Snow Geese of the Western Canadian Arctic and Wrangel Island, Russia, by Richard H. Kerbes, Katherine M. Meeres, and James E. Hines, eds.
Cat. No. CW69-1/98E. Publ. 1999.
No. 99
Breeding ecology of the Horned Grebe *Podiceps auritus* in subarctic wetlands, by Michael A. Fournier and James E. Hines.
Cat. No. CW69-1/99E. Publ. 1999.
No. 100
Behaviour and ecology of sea ducks, by R. Ian Goudie, Margaret R. Petersen, and Gregory J. Robertson, eds.
Cat. No. CW69-1/100E. Publ. 1999.
No. 101
Assessment of bird populations in the Rasmussen Lowlands, Nunavut, by Victoria H. Johnston, Cheri L. Gratto-Trevor, and Stephen T. Pepper.
Cat. No. CW69-1/101E. Publ. 2000.
No. 102
Population modelling and management of Snow Geese, by Hugh Boyd, ed. Disponible également en français.
Cat. No. CW69-1/102E. Publ. 2000.
No. 103
Towards conservation of the diversity of Canada Geese (*Branta canadensis*), by Kathryn M. Dickson, ed.
Cat. No. CW69-1/103E. Publ. 2000.
No. 104
Estimates of shorebird populations in North America, by R.I.G. Morrison, R.E. Gill, Jr., B.A. Harrington, S. Skagen, G.W. Page, C.L. Gratto-Trevor, and S.M. Haig.
Cat. No. CW69-1/104E. Publ. 2001.
No. 105
Status and population trends of the Razorbill in eastern North America, by G. Chapdelaine, A.W. Diamond, R.D. Elliot, and G.J. Robertson.
Cat. No. CW69-1/105E. Publ. 2001.
No. 106
Studies of high-latitude seabirds. 5. Monitoring Thick-billed Murres in the eastern Canadian Arctic, 1976–2000, by A.J. Gaston.
Cat. No. CW69-1/106E. Publ. 2002.
No. 107
Changes in reported waterfowl hunting activity and kill in Canada and the United States, 1985–1998, by H. Boyd, H. Lévesque, and K.M Dickson. Disponible également en français.
Cat. No. CW69-1/107E. Publ. 2002.
No. 108
Lead fishing sinkers and jigs in Canada: Review of their use patterns and toxic impacts on wildlife, by A.M. Scheuhammer, S.L. Money, D.A. Kirk, and G. Donaldson. Disponible également en français.
Cat. No. CW69-1/108E. Publ. 2003.

		Pages
1	North Water Polynya	19
2	Seymour Island	21
3	Hell Gate and Cardigan Strait	22
4	Queens Channel	24
5	Skruis Point	26
6	Eastern Jones Sound	27
7	Browne Island	29
8	Cape Liddon	30
9	Hobhouse Inlet	32
10	Eastern Lancaster Sound	34
11	Prince Leopold Island	36
12	Cape Hay	38
13	Baillarge Bay	40
14	Batty Bay	42
15	Cape Graham Moore	43
16	Creswell Bay	45
17	Buchan Gulf	47
18	Scott Inlet	49
19	Amundsen Gulf and Cape Bathurst Polynya	51
20	Lambert Channel	53
21	Cape Searle (Qaqulluit) and Reid Bay (Minarets, Akpait)	54
22	Foxe Basin	56
23	Cumberland Sound	58
24	East Bay	59
25	Markham Bay	61
26	Coats Island	62
27	Digges Sound	64
28	Frobisher Bay	66
29	Button Islands	68
30	Akpatok Island	70
31	Ungava Bay Archipelagoes	72
32	Sleeper Islands	74
33	Belcher Islands	76
34	Northern Ontario Coastline	78


Beaufort Sea
Greenland
Baffin Bay
Nunavut
Northwest Territories
Hudson Bay
Manitoba
Saskatchewan
Ontario
Quebec
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
N
W
E
S
200 0 200 400
km

ENVIRONMENTAL CHOICE
CHOIX ENVIRONNEMENTAL